



NAVAL  
POSTGRADUATE  
SCHOOL

MONTEREY, CALIFORNIA

**THESIS**

**IMPLEMENTING KNOWLEDGE MANAGEMENT AS A  
STRATEGIC INITIATIVE**

by

Joseph DiGiacomo

December 2003

Thesis Advisor:  
Second Reader:

David V. Lamm  
Donald Summers

**Approved for public release; distribution is unlimited**

THIS PAGE INTENTIONALLY LEFT BLANK

<b>REPORT DOCUMENTATION PAGE</b>			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
<b>1. AGENCY USE ONLY (Leave blank)</b>		<b>2. REPORT DATE</b> December 2003	<b>3. REPORT TYPE AND DATES COVERED</b> Master's Thesis	
<b>4. TITLE AND SUBTITLE:</b> Implementing Knowledge Management as a Strategic Initiative			<b>5. FUNDING NUMBERS</b>	
<b>6. AUTHOR(S)</b> Joseph DiGiacomo				
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Postgraduate School Monterey, CA 93943-5000			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A			<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>	
<b>11. SUPPLEMENTARY NOTES</b> The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release; distribution is unlimited			<b>12b. DISTRIBUTION CODE</b>	
<b>13. ABSTRACT (maximum 200 words)</b> <p>This research is intended as an implementation guide for managers to apply knowledge management as a strategic initiative within the contracting element of a major system command. The study incorporates the four-pillar model of knowledge management developed by Dr. Michael Stankosky. The four pillars within the model are: leadership, organization, technology and learning. Knowledge management was one of five strategic initiatives in the overall strategic plan, which was developed using Kaplan and Norton's Balanced Scorecard methodology. The thesis discusses the elements of knowledge management as well as how contracting organizations can be improved by incorporating knowledge management as a strategic initiative.</p>				
<b>14. SUBJECT TERMS</b> Knowledge Management, Contracting, Procurement, Strategic Initiative			<b>15. NUMBER OF PAGES</b> 85	
			<b>16. PRICE CODE</b>	
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified	<b>20. LIMITATION OF ABSTRACT</b> UL	

THIS PAGE INTENTIONALLY LEFT BLANK

**Approved for public release; distribution is unlimited**

**IMPLEMENTING KNOWLEDGE MANAGEMENT  
AS A STRATEGIC INITIATIVE**

Joseph DiGiacomo  
Civilian, United States Army  
B.S., State University of New York at Buffalo, 1974

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF SCIENCE IN CONTRACT MANAGEMENT**

from the

**NAVAL POSTGRADUATE SCHOOL  
December 2003**

Author: Joseph DiGiacomo

Approved by: David V. Lamm  
Thesis Advisor

Donald Summers  
Second Reader

Douglas A. Brook, Ph.D.  
Dean, Graduate School of Business and Public Policy

THIS PAGE INTENTIONALLY LEFT BLANK

## **ABSTRACT**

This research is intended as an implementation guide for managers to apply knowledge management as a strategic initiative within the contracting element of a major system command. The study incorporates the four-pillar model of knowledge management developed by Dr. Michael Stankosky. The four pillars within the model are: leadership, organization, technology and learning. Knowledge management was one of five strategic initiatives in the overall strategic plan, which was developed using Kaplan and Norton's Balanced Scorecard methodology. The thesis discusses the elements of knowledge management as well as how contracting organizations can be improved by incorporating knowledge management as a strategic initiative.

THIS PAGE INTENTIONALLY LEFT BLANK



# TABLE OF CONTENTS

<b>I. INTRODUCTION .....</b>	<b>1</b>
<b>A. BACKGROUND .....</b>	<b>1</b>
<b>B. OBJECTIVE .....</b>	<b>1</b>
<b>C. RESEARCH QUESTIONS .....</b>	<b>2</b>
<b>D. SCOPE OF THE THESIS.....</b>	<b>2</b>
<b>E. LITERATURE REVIEW AND METHODOLOGY.....</b>	<b>2</b>
<b>F. CHAPTER OUTLINE.....</b>	<b>3</b>
<b>II. BACKGROUND AND THEORETICAL FRAMEWORK.....</b>	<b>5</b>
<b>A. KNOWLEDGE MANAGEMENT .....</b>	<b>5</b>
1. Background .....	5
2. Definition of Knowledge Management.....	5
3. Theory of Knowledge Management .....	6
4. Verification of the Key Elements.....	7
5. Application of the Four Pillars of Knowledge Management .....	7
a. Leadership .....	8
b. Organization.....	9
c. Technology .....	10
d. Learning .....	11
6. Summary.....	12
<b>B. CONTRACT MANAGEMENT BODY OF KNOWLEDGE .....</b>	<b>12</b>
1. Overview .....	12
2. Structure .....	13
<b>C. REVIEW OF THE ORGANIZATION.....</b>	<b>13</b>
1. The CECOM Mission .....	14
2. The CECOM Acquisition Center .....	14
<b>D. CHAPTER SUMMARY.....</b>	<b>15</b>
<b>III. ESSENTIAL ELEMENTS OF A KNOWLEDGE MANAGEMENT MODEL .....</b>	<b>17</b>
<b>A. INTRODUCTION.....</b>	<b>17</b>
<b>B. THE ENVIRONMENT .....</b>	<b>18</b>
1. External Environment and Influences .....	18
2. Internal Environment.....	21
<b>C. THE FOUR PILLARS MODEL OF KNOWLEDGE MANAGEMENT .....</b>	<b>23</b>
1. Background .....	24
2. Knowledge .....	25
3. Three Pillars Model .....	25
4. Peter M. Senge, The Fifth Discipline.....	26
5. Other Models.....	26
6. Difficulty with Developing a Model.....	26
7. Key Elements, sub-elements and Disciplines Associated with knowledge management .....	27

8.	Findings of Dr. Calabrese.....	29
D.	FOUNDATIONAL SKILLS AND SUBJECTS ESSENTIAL FOR ACQUISITION PROFESSIONALS.....	29
1.	Historical View of the Contracting Professional.....	29
2.	Competencies, Skills and Disciplines Required by Contracting Professionals.....	30
3.	General Business Skills.....	32
4.	Foundational or Core Acquisition Competencies.....	33
5.	Subject Matter Competencies.....	34
6.	Task Level Competencies.....	35
E.	CHAPTER SUMMARY.....	36
IV.	KNOWLEDGE MANAGEMENT SYSTEM MODEL.....	37
A.	INTRODUCTION.....	37
B.	THE ENVIRONMENT.....	37
1.	External Environment and Influences.....	37
2.	Internal Environment.....	39
C.	STANKOSKI'S FOUR PILLARS OF KNOWLEDGE MANAGEMENT.....	39
1.	Leadership.....	39
a.	Strategic Themes.....	41
b.	The Cause and Effect Story.....	42
c.	The Strategic Theme View.....	45
d.	A Strategic Culture.....	46
2.	Organization.....	47
3.	Technology.....	52
4.	Learning.....	54
5.	Summary.....	57
D.	PROCESS FLOW.....	57
1.	High Level Functional Architecture.....	58
a.	Operations.....	60
a.	Vital and Critical Information.....	61
E.	MEASURABLE CORE STRATEGIC OBJECTIVES.....	62
1.	Metrics.....	63
2.	Critical Knowledge Needed to Achieve Strategic Objectives.....	63
F.	CHAPTER SUMMARY.....	65
V.	CONCLUSIONS AND RECOMMENDATIONS.....	67
A.	INTRODUCTION.....	67
B.	CONCLUSIONS.....	67
1.	Knowledge transfer within the Department of Defense is becoming more and more critical.....	67
3.	Effective Knowledge Management Systems are part of an overall strategic plan that satisfies mission and vision goals of the organization.....	68
4.	The knowledge, skill and abilities required to successfully perform the duties associated with contract management are an integral part of the contract professional's job.....	68

5.	There does not appear to be a direct correlation between the effort expended on knowledge management and the value of knowledge management. ....	69
C.	RECOMMENDATIONS.....	69
1.	Supervisors at all levels should determine through face to face discussions and review of contract files the level of experience for every employee under their supervision. ....	69
2.	Organizations should be encouraged to link knowledge transfer between employees to the strategic goals of the organization. ....	69
3.	Organizations should periodically reassess their knowledge management strategies to ensure continued efficacy.....	69
4.	Contracting activities should foster an environment where experienced contracting officers and contract specialists want to transfer their knowledge to newer employees and those without the experience. ....	70
5.	Organizations should be encouraged to take a systems approach to developing a knowledge management system.....	70
D.	ANSWERS TO RESEARCH QUESTIONS .....	70
1.	How can contracting organizations be improved by incorporating knowledge management as a strategic initiative? ..	70
2.	What is knowledge management? .....	71
3.	What are the elements of a knowledge management system? .....	71
4.	Can the benefits of knowledge management be measured within the Communications Electronics Acquisition Center? .....	72
5.	How can the results of this study be generalized and applied to other acquisition organizations and processes? .....	72
E.	SUGGESTIONS FOR FUTURE RESEARCH.....	72
APPENDIX A. NCMA’S CONTRACTING PRINCIPLES FOUNDATIONAL, SUBJECT MATTER AND TASK LEVEL COMPETENCIES .....		75
A.	NCMA’S CONTRACTING PRINCIPLES FOUNDATIONAL, SUBJECT MATTER AND TASK LEVEL COMPETENCIES .....	75
B.	NCMA’S ACQUISITION PLANNING/STRATEGY FOUNDATIONAL, SUBJECT MATTER AND TASK LEVEL COMPETENCIES .....	76
C.	NCMA’S CONTRACT ADMINISTRATION FOUNDATIONAL, SUBJECT MATTER AND TASK LEVEL COMPETENCIES .....	77
D.	NCMA’S SPECIALIZED KNOWLEDGE FOUNDATIONAL, SUBJECT MATTER AND TASK LEVEL COMPETENCIES .....	78
E.	NCMA’S GENERAL BUSINESS FOUNDATIONAL, SUBJECT MATTER AND TASK LEVEL COMPETENCIES .....	79
LIST OF REFERENCES.....		81
INITIAL DISTRIBUTION LIST .....		85

THIS PAGE INTENTIONALLY LEFT BLANK

## **ACKNOWLEDGMENTS**

Thank you to the Naval Postgraduate School faculty for making a personal goal a reality. A special thank you to Dr. David V. Lamm and Don Summers for their help and support on this thesis effort.

Lastly, I want to thank my wife, Susan, and our children, Felicia and Franklin. Without your love, support and continued encouragement this goal would not have been possible.

THIS PAGE INTENTIONALLY LEFT BLANK

# **I. INTRODUCTION**

## **A. BACKGROUND**

Despite their best efforts, most organizations continue to squander what may be their greatest asset in today's knowledge economy - the wealth of experience, ideas, and insights that are scattered across or deeply embedded within their organizations. Capitalizing on those intellectual resources and using existing knowledge to improve performance or combining strands of knowledge to create something new can help organizations respond to an array of challenges from the effects of downsizing to those of retirements.

It is noted that budget cuts and downsizing appear to be the continuing mantra within the Department of Defense (DoD). Over the next five years almost fifty percent of the DoD workforce will be eligible for retirement. Budget cuts and retirements will portend leaner organizations within DoD. On a positive note, these conditions will also heighten interest in knowledge management. Within the next five years it is imperative that the transfer of skills and corporate knowledge be propagated within the Department of Defense to maintain the military's ability to protect the citizens of the United States and her allies.

Notwithstanding the potential brain drain within DoD, it is more important than ever that the full benefits of an organization's knowledge need to be transferred to all its employees for the organization to be truly effective. In the corporate world it is recognized that the energy expended on knowledge management initiatives are helping corporations to achieve satisfied customers. Recent DoD initiatives in the knowledge management area signify that DoD also recognizes knowledge management benefits.

When one considers the increased workload and reduced workforce it is essential that every DoD worker know all they're capable of knowing.

## **B. OBJECTIVE**

The purpose of this study is to provide useful, relevant, timely, and transferable information to the Communications Electronics Command (CECOM) Acquisition Center

about knowledge management to improve performance of the entire organization. This study will provide an overview of how the organization can adjust to meet future Department of Defense requirements. Finally, it will provide suggestions for other organizations to provide added value strategies for the organization and its customers.

### **C. RESEARCH QUESTIONS**

The primary research question is:

- How can acquisition processes be improved by incorporating knowledge management as a strategic initiative?

In support of the primary research question, the following supplementary questions will be examined:

- What is knowledge management?
- What are the elements of a knowledge management system?
- Can the benefits of knowledge management be measured within the Communications-Electronics (CECOM) Acquisition Center?
- How can the results of this study be generalized and applied to other acquisition organizations and processes?

### **D. SCOPE OF THE THESIS**

This research is intended as an implementation guide for managers to apply knowledge management processes to the contract element within the acquisition community of a major system command. This thesis is limited to the study of incorporating knowledge management to a DoD contracting organization in a disciplined way through the use of strategic planning. Also included is a discussion of simple measures to assess the benefits of incorporating knowledge management into a DoD major contracting organization. Further, the implementation guide is restricted to contracting organizations at a major system command.

### **E. LITERATURE REVIEW AND METHODOLOGY**

To answer the research questions presented in the previous section, a qualitative research approach was employed that included a comprehensive literature review and



workplace observations based on my 28 years with the Department of Defense. Initially, the research was conducted using literature that consisted of books, magazine articles, other library information resources, applicable General Accounting Office reports as well as acquisition and knowledge management related websites. The body of knowledge that is utilized within the CECOM Acquisition Center was identified. Also identified were knowledge management processes and structures operating within CECOM Acquisition Center.

#### **F. CHAPTER OUTLINE**

It is intended that this thesis will be organized into five chapters. The first chapter will serve as an introduction. The second chapter provides background with an overview of knowledge management and strategic planning. The third chapter executes the research methodology. The fourth chapter develops a model for implementation and the fifth chapter provides conclusions, recommendations and potential areas for future study.

#### **G. BENEFITS OF THE RESEARCH**

This research paper will aim to shift the focus within the acquisition community from strictly obtaining data to transforming data into knowledge and transferring that knowledge throughout an organization. Focus will be on the human interactions that exist and those that need to be developed to compete in an ever more downsized acquisition community. Additionally, it is intended to provide useful, relevant and timely information to other organizations struggling with these issues. This research develops a plan with potential for migration from the present to a more efficient and measurable usage of knowledge.

THIS PAGE INTENTIONALLY LEFT BLANK

## **II. BACKGROUND AND THEORETICAL FRAMEWORK**

This chapter provides background of Knowledge Management, the Contract Management Body of Knowledge and the structure and mission of the CECOM Acquisition Center.

### **A. KNOWLEDGE MANAGEMENT**

#### **1. Background**

Knowledge management is not new. Although the terminology, knowledge management, was not widely used until the mid-1990s, it has been studied by philosophers and practiced for centuries. Rod Newing retraced the origins and evolution of knowledge management starting with the cuneiform language in about 3,000 B.C. and going through the main discoveries that made the management of knowledge possible (papyrus, parchment, the invention of the printing press, etc.) [Ref 1] Documenting the more recent boom of the Knowledge Management (KM) movement began with Karl Erik Sveiby in the 1980s [Ref 2], followed by a 1991 Fortune magazine article, entitled: "Brainpower" by Tom Stewart. [Ref 3] The foundations of modern Knowledge Management were developed by Karl Wiig (three volume work published in 1993 and 1994), [Ref 4] Nonaka and Takeuchi [Ref 5] and Davenport and Prusak. [Ref 6]

Knowledge management is important because of the transformation of our economy. Since 1991, the United States has been moving from an industrial economy to an information-based economy. In the information economy, innovation, service, quality, speed and knowledge sharing are the defining factors. [Ref 7] Ideas and knowledge are its principal raw materials. In an information economy environment, intellectual capital becomes a critical metric for determining the economic value of an organization.

#### **2. Definition of Knowledge Management**

There are many definitions of KM. Two are selected:

- “Knowledge management is the systematic, explicit, and deliberate building, renewal and application of knowledge to maximize an enterprise’s knowledge-related effectiveness and return from its knowledge assets.” [Ref 4]
- “Knowledge management is the process of capturing a company’s collective expertise wherever it resides – in databases, on paper, or in peoples’ heads – and distributing it to wherever it can help produce the biggest payoff.” [Ref 8]

### **3. Theory of Knowledge Management**

Knowledge Management, especially if Knowledge Management is to be applicable, universal, and relevant across all enterprises, and rightly claim its place among academic disciplines in this knowledge age, knowledge management requires theoretical support. In 1999, Dr. Michael Stankosky believed we were ready for a theory of knowledge management. Webster’s New World Dictionary defines a theory as “a formulation of apparent relationships or underlying principles of certain observed phenomena which have been verified to some degree.” Stankosky began to survey what was being said, written, and practiced around the world in Knowledge Management. Relationships began to form. These relationships were collected and grouped under four major headings: leadership/management, organization, technology and learning. Under each of those major headings many key elements were documented, such as business culture, vision sharing, strategic planning resource allocation, performance criteria, tacit and explicit knowledge understood, virtual teams, communities of practice, innovations encouraged, recognized and rewarded; data warehousing, groupware, intelligent agents, neural networks, decision support systems, etc. The listing also encompassed many disciplines, such as computer science, operations research, management science, psychology, organizational development, epistemology, anthropology, philosophy, systems engineering, etc. What emerged was a strong multidisciplinary theory. The critical aspect of the theory was first to ensure it had the right elements identified, second was to come up within accepted means of validation and third was to obtain legitimacy

by seeking degree-granting approval from a major university in order to attract students and faculty to do the research and studies. One key point to stress is that Stankosky was not researching or studying the study of knowledge, but how to manage knowledge. The operative word in Knowledge Management is management. [Ref 10]

In the literature review of Knowledge Management, many authors dealt with the subject of knowledge and learning – more so than with transferring, sharing, and leveraging the knowledge already obtained within the enterprise. Stankosky was not competing with or replacing epistemology, the theory of the origins, nature, methods and limits of knowledge, nor the disciplines found in educational curriculum on how one learns (pedagogy). When a person is hired, they are hired for the intellectual capital they already possess, and the organization ensures that the intellectual capital is audited, captured, shared when needed and the individual knowledge is turned into organizational knowledge. In addition to the management aspects of Knowledge Management, the identification and integration of all those key elements is the essence of a successful Knowledge Management system, according to Stankosky's theory. [Ref 10]

#### **4. Verification of the Key Elements**

The validation process chosen by Stankosky was to validate through survey. The listing of four groupings and key elements were sent to a select group of industry Knowledge Management experts and practitioners. They were asked to verify the critical role of the groupings and key elements for success, and list others not included. The results supported the four groupings and elements. While one survey and 40 dedicated Knowledge Management researchers do not make a theory, Stankosky has a start on validating his theory. He has in place the mechanism to research further, and is operating under the legitimacy of a degree-granting Knowledge Management program, with 40 dedicated Knowledge Management researchers, both faculty and students. [Ref 10]

#### **5. Application of the Four Pillars of Knowledge Management**

The new business environment demands foresight, superior performance, innovation and adaptation, rather than traditional emphasis on optimization. Effective and complete planning for enterprise Knowledge Management is critical. The

“Architecture of Enterprise Engineering,” developed by Stankosky and associates of the George Washington University Institute of Knowledge Management, has been implemented and proven in the operational environment. The four enterprise engineering pillars are leadership, organization, technology, and learning in support of enterprise-wide Knowledge Management initiatives. In application, the pillars represent critical success factors for Knowledge Management implementation. To achieve a basic entry level Knowledge Management program, all four pillars must be addressed. Here’s a brief summary of the four pillars as they apply to the reality of Knowledge Management implementation: [Ref 10]

***a. Leadership***

Leadership develops business and operational strategies to survive and position for success in today’s dynamic environment. Those strategies determine vision, and must align knowledge management with business tactics to drive the value of knowledge management throughout the enterprise. Leadership establishes and implements the strategy and nourishes the culture and climate, which the strategy necessitates. Leadership interacts with the environment to position itself for success. Focus must be placed on building executive support and knowledge management champions. Knowledge management systems require a champion or leader who can provide strong and dedicated leadership needed for cultural change.

Sub-elements of Leadership:

- Business Culture
- Strategic Planning, including Vision and Goal setting
- Climate
- Growth
- Segmentation
- Communications

***b. Organization***

The value of knowledge creation and collaboration should be intertwined throughout an enterprise. The organizational structure must support the strategy. Operational processes must align with the knowledge management framework and strategy, including all performance metrics and objectives. While operational needs dictate organizational alignment, a Knowledge Management system must be designed to facilitate knowledge management throughout the organization. Operational processes must be aligned with the new vision while redesigning the organization and identifying key levers of change, including roles and responsibilities. Introducing knowledge management requires organizational change, and knowledge management inevitably acts as a catalyst to transform the organization's culture. The increasing value placed on highly capable people, rising job complexity and the universal availability of information on the Internet are fundamental changes contributing to the move by organizations to leverage knowledge management solutions. In order to begin changing the organization, knowledge management must be integrated into the business processes. The right business processes and performance management systems must be strong enough to deal with turbulence yet flexible enough to adapt to change.

Sub-elements of Organization:

- Business Process Re-engineering, including processes and procedures
- Metrics
- Management By Objective
- Total Quality Management and Leadership
- Workflow
- Communications

### *c. Technology*

Technology enables and provides all of the infrastructure and tools to support Knowledge Management within an enterprise. While cultural and organizational changes are vital to achieving a Knowledge Management strategy, a lack of proper tools and technology infrastructure can lead to failure. Any technical solution must add value to the process and achieve measurable improvements. Properly assessing and defining Information Technology capabilities is essential. The Gartner Group defines ten technologies that collectively make up full-function Knowledge Management. The functional requirements that enterprises can select and use to build a Knowledge Management solution include:

- Capture and store
- Search and retrieve
- Send critical information to individuals or groups
- Structure and navigate
- Share and collaborate
- Synthesize
- Profile and personalize
- Solve or recommend
- Integrate with business applications and
- Maintenance

No technology product meets every requirement, and before selecting a solution, enterprises need to clearly define their Knowledge Management strategy, scope and requirements, and perform product evaluations to identify technology products that effectively meet their needs.

Sub-elements of Technology:

- E-Mail



- On-Line Analytical Processing
- Data Warehousing
- Search Engines
- Decision Support
- Process Modeling
- Management Tools
- Communications

#### *d. Learning*

The best tools and processes alone will not achieve a Knowledge Management strategy. Ultimately, people are responsible for using the tools and performing the operations. Creating organizational behavior that supports a Knowledge Management strategy will continue long after the system is established. Organizational learning must be addressed with approaches such as increasing internal communications, promoting cross-functional teams, and creating a learning community. Learning is an integral part of knowledge management. In this context, learning can be described as the acquisition of knowledge or a skill through study, experience, or instruction. Enterprises must recognize that people operate and communicate through learning that includes the social processes of collaborating, sharing knowledge and building on each other's ideas. Managers must recognize that the knowledge resides in people, and knowledge creation occurs in the process of social interaction and learning.

Sub-elements of Learning:

- Innovation versus Invention
- Intuition
- Learning Community
- Virtual Teams
- Shared Results

- Exchange Forums
- Communications

## **6. Summary**

It is evident that the need for knowledge management translates throughout the entire enterprise. It is not a separate function characterized by a separate Knowledge Management department or a Knowledge Management process; it must be embedded into all of the organization's business processes. Knowledge management is crucial to achieving permanent performance improvement and innovation. Efficient knowledge-intensive core processes and a fundamental architecture must be established to effectively initiated and implement Knowledge Management. The four pillars clearly provide architecture.

## **B. CONTRACT MANAGEMENT BODY OF KNOWLEDGE**

### **1. Overview**

A Body of Knowledge (BOK) is one of the essential requirements of any activity desiring to be accepted as a profession. A true body of knowledge is representative of an entire profession, including subsets, and is non-proprietary in nature. The purpose of the contract management body of knowledge is to: (a). Describe the environment in which the acquisition management professional will be working; and (b). Define the knowledge, skills, abilities, and interrelationships necessary to successfully perform the full range of tasks and duties required of Acquisition Management professional.

The National Contract Management Association (NCMA) developed the contract management body of knowledge by benchmarking tasks and duties that are currently being performed by practitioners in the functions that together comprise the acquisition management environment. NCMA performed their benchmarking process in conjunction with other organizations and associations involved in the acquisition management profession. The top-level outline is attached. A detailed outline is published periodically, the last in September 2002. [Ref 10]

## 2. Structure

The knowledge, skills, and abilities required to successfully perform the tasks and duties associated with Contract Management are an integral part of the Acquisition Management profession. The NCMA Body Of Knowledge has the following top-level taxonomy. They are:

- **Contract Principles** – fundamentals of acquisition that all contracting professionals must comprehend.
- **Preaward** – activities and events required planning for and awarding a contract.
- **Contract Administration** – issues that arise during the performance of a contract.
- **Subspecialties** – those areas that require additional specialized knowledge.
- **General Business** – portions of other disciplines relevant to contract management.

Under this top level the charts in Section II depict these areas with two additional levels of sub-classification for each area. They provide a vehicle for one to readily assimilate the relationship among the various elements. At lower levels, the classification scheme requires some arbitrary allocations in order to make the assignments mutually exclusive. In addition, many tasks at the lower levels require knowledge and comprehension of the other parts of the BOK.

## C. REVIEW OF THE ORGANIZATION

The organizational structure of the Communication Electronic Command (CECOM) and the CECOM Acquisition Center (CECOM AC) were reviewed. Headquarters CECOM is located at Fort Monmouth, New Jersey and is a major subordinate command of the Army Materiel Command, which is located in Alexandria, Virginia.

## **1. The CECOM Mission**

The CECOM mission is fully defined in CECOM Regulation 10-1, is detailed below:

To exercise life cycle integrated management, project management, and systems acquisition, including research, development, engineering, product assurance, fielding, testing, production, materiel acquisition, readiness, and integrated logistics support of assigned DOD/Army tactical strategic and sustaining based information technology; command, control, communications, computers and intelligence; electronic warfare, sensors (IT/C4IEWS) systems and equipment. [Ref 11]

To fulfill this mission, the CECOM Fort Monmouth elements consist of the Commanding General and his staff (i.e., Resource Management, Personnel, Legal, Corporation Information, etc.), the U.S. Army Garrison Commander and his staff (i.e., Department of Public Works, Transportation, Garrison Budget Housing, etc.) and five Centers (Logistics and Readiness; Systems Management; Research, Development and Engineering; Software Engineering and Acquisition). In addition, this mission is supported by four Program Executive Officers (PEOs): Command, Control, Communications systems Tactical (C3T); Intelligence, Electronic Warfare and Sensors (IEW&S); Enterprise Information Systems (EIS); and Aviation. These PEOs are supported by a significant number of Program Managers (PMs), both physically located at Fort Monmouth and elsewhere.

## **2. The CECOM Acquisition Center**

The CECOM Acquisition Center is headquartered at Fort Monmouth, New Jersey with primary subsidiary offices in Washington, D.C. and Fort Huachuca, Arizona. There are several small remote offices in the United States. The Acquisition Center provides acquisition services in support of PEOs and the five Centers of CECOM. Within the CECOM AC are six Sectors; each led by a GS-15 Chief reporting to the Deputy Director, who reports to the Director. There are three “buying” sectors physically located at Fort

Monmouth. The primary subsidiary offices in Washington, D.C. and Arizona are also buying sectors. New Jersey also has an Acquisition Process Business Sector.

#### **D. CHAPTER SUMMARY**

This chapter provided background information on Knowledge Management, the Contract Management Body of Knowledge and the structure and mission of the CECOM Acquisition Center. The information provides is the foundational information upon which the balance of the thesis is based. Definitions of Knowledge Management definitions were provided; the theory of knowledge management was presented, along with the verification of key elements. Dr. Michael Stankosky's four pillars of Knowledge Management were presented. The four pillars are: Leadership, Organization, Technology and Learning. The Contract Management Body of Knowledge was presented. A Body of Knowledge is one of the essential requirements of any activity desiring to be accepted as a profession, and that is also true for contracting professionals. The NCMA Body Of Knowledge has five top-level areas: Contract Principles, Preaward, Contract Administration, Subspecialties, and General Business. Under these top level areas are two additional levels of sub-classification for each area. The chapter concluded with a description of the Communications Electronics Command and the CECOM Acquisition Center.

THIS PAGE INTENTIONALLY LEFT BLANK

### **III. ESSENTIAL ELEMENTS OF A KNOWLEDGE MANAGEMENT MODEL**

#### **A. INTRODUCTION**

This chapter will lay the foundation for a Knowledge Management Model. It will also identify foundational subjects, essential to the acquisition professional as well as the skills and competencies of those professionals. The source of this knowledge is through literature examination. To do an examination of the literature as it relates to both Dr. Michael Stankosky's Knowledge Management model and the foundational subjects and skills essential to acquisition professionals, this chapter is organized in the following manner: overall environmental influences; Stankosky's four pillars (Leadership, Organization, Technology, and Learning); and finally the foundational subjects and skills essential to acquisition professionals.

Research shows that the average knowledge worker now spends approximately 25 percent of his or her day looking for information either internally or externally. [Ref 12] Anything that can reduce this effort or increase the quality of the information acquired would be helpful. Secondly, there is simply more content out there today than can be processed by organizations. The Microsoft intranet site, for example, now makes 2.2 million documents available to its staff. [Ref 13] "Our ability to store and communicate information has far outpaced our ability to search, retrieve and present the information." [Ref 14] Third, organizations are realizing that they could, and should, be doing more with the content that they have. Although most are still unable to leverage the data they have, and cannot turn the content into knowledge and results, this remains a strong vision for them. [Ref 15] In reality, many organizations have significant content gaps on their intranet and Internet sites, which need to be filled. Fourth, the technology available to manage different types of content is improving and converging. In years past, different software was used to manage documents, web pages and digital assets. Today, the lines between these tools are blurring. Today's integrated software is moving towards the possibility of managing an entire organization's capabilities. The long-term vision for

this integrated software includes improved decision-making, better utilization of information and the collection of competitive intelligence.

## **B. THE ENVIRONMENT**

The environmental influences for a KM professional and acquisition professional are similar. There are social, political, governmental and economic influences on these professionals. Influences can be categorized as either external or internal.

### **1. External Environment and Influences**

The external environment is everything outside the organization. The national and international situation definitely influences the external environment. In this post-Cold War world, it is obvious that we are living in dangerous times. The United States is fighting a war on terrorism, which began on 11 September 2001, and the war is still ongoing. At present, there is no end in sight to this war. While fighting this war, the United States continues to strengthen its defense posture to protect the nation's interests, and to assure its lead role in global affairs. Shortly after his inauguration, President Bush called for a review of all U.S. military capabilities and how best to achieve the necessary transformation to meet the new challenges of the 21st Century. The new security environment requires a military force that is balanced to counter both conventional and unconventional threats. The United States is developing and fostering new and innovative technologies that will ultimately support the war fighter. These technologies are developed and then integrated into current and future weapon systems being developed and fielded by the 21 Program Executive Officers within the armed forces. Delay in development of new innovative technologies can jeopardize war fighters' lives, especially during combat. Within the U.S. forces, the U.S. Army is racing to find solutions to the current threats it sees here and overseas. Most of today's Army weapons use Commercial Off the Shelf (COTS) technologies and our adversaries are extremely capable of using the same COTS technologies to defeat last years weapon. Compounding the problem of rapidly developing and fielding new technologies is the reduced quantity of acquisition workforce employees.

It has been stated in numerous reports that the DoD acquisition workforce will lose potentially large numbers of civilian baby-boomers when they become eligible to



retire from the DoD in the near term. Fifteen consecutive years of downsizing, base realignments and closures, budget reductions, and an aging workforce have significantly changed the overall DoD civilian workforce. In their report, number GAO-01-565T, released on 29 March 2001, GAO stated that between 1989 and 1999, the Department of Defense reduced its civilian workforce by more than 403,000 positions, from 1,117,000 in 1989 to the estimated 714,000 in 1999. [Ref 16] This decrease represents a 36 percent reduction. Then President Clinton's fiscal year 2001 budget request projected additional reductions in DoD civilian workforce; down to a level of 637,500 by FY 2005. Overall, these reductions equate to a cumulative reduction of 43 percent from the fiscal year 1989 level to the fiscal year 2005 projection. The same report noted there was a strong shift toward an older workforce. While an older workforce has more experience, it portends that the workforce will be eligible for retirement in greater number. Not surprisingly, 58 percent of the workforce will be eligible for early or regular retirement by 2006. Since 1989, there was a 69 percent drop in the number of civilians with less than five years of Government service, but only a 4 percent drop in the number of civilians with 11 to 30 years of Government service. As of September 1999, the last year that figures from the GAO are available, only 6.4 percent of the DoD civilian workforce was under the age of 31, compared to 17 percent in 1989. The net effect is a workforce that is unbalanced by age and experience and that puts orderly transfer of institutional knowledge at risk. [Ref 16]

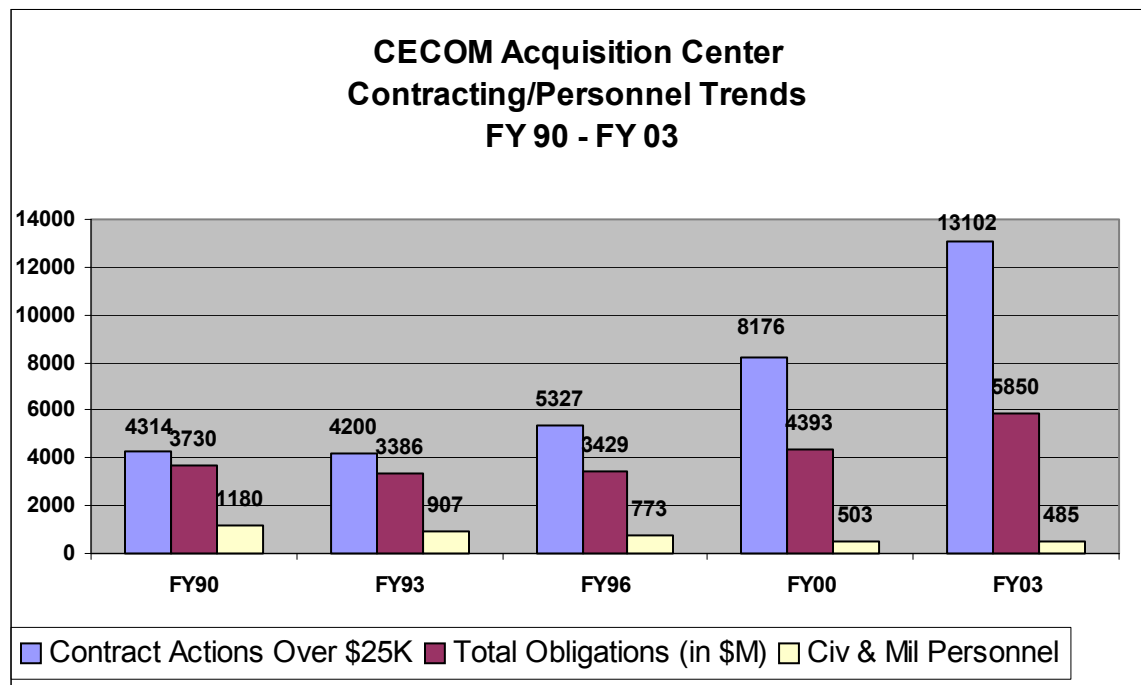
To address this potentially difficult situation, in FY 2000, the Offices of the Under Secretaries of Defense (OUSD) for Personnel and Readiness and Acquisition, Technology, and Logistics (AT&L) sponsored a Task Force, the Acquisition Workforce 2005 Task Force, to address the anticipated wave of retirements that could begin as early as 2005. The Task Force compiled a report, "Shaping the Acquisition Workforce of the Future," recommending 31 initiatives in the areas of human capital strategic planning, recruiting and hiring, career development, workforce management and quality of life. Since this report was published in October 2000, AT&L has put a major thrust behind human capital strategic planning, recognizing that the majority of actions taken in other areas, such as recruiting and hiring, hinge on the successful implementation of DoD's human capital strategic planning. Through this planning process, initiatives or actions

were identified to “shape” the workforce for the future by addressing the gaps identified between the current workforce and the future desired workforce. The recommendations of the Acquisition Workforce 2005 Task Force are being implemented by each of the Directors of Acquisition Career Management and the OUSD (AT&L) through a number of workforce improvement initiatives in the areas of recruiting, career development, retention, and workforce management. The General Accounting Office (GAO) has reviewed and reported progress, affirming that the Department has moved forward in laying the foundation for shaping the future workforce. Several of the initiatives and best practices are integrated into the Acquisition Workforce Civilian Personnel Demonstration Project. On 7 November 2003, Congress passed the FY 2004 National Defense Authorization Act, which authorized a new personnel management system for the entire Department of Defense to cope with the challenges of the future. Furthermore, to ensure that the workforce is highly skilled and fully qualified, the Defense Acquisition University (DAU) is modernizing it and reengineering training for the critical career fields of contracting and program management. At the same time, DAU is also preparing to add new training for sustainment, technology management, and facilities engineering, as well as continuous-learning training to keep knowledge and skills up-to-date. In addition, OUSD (AT&L) continues to work to institutionalize human capital strategic planning for the DoD Acquisition, Technology, and Logistics (AT&L) workforce. Consistent with the approach recommended by the GAO, each Military Department and four of the Defense Agencies prepared human capital strategic plans for their AT&L workforce upon concluding the second annual cycle in May 2002. In October 2002, USD (AT&L) issued a policy memorandum that established an annual Human Capital Strategic Planning (HCSP) process for the DoD AT&L workforce, stating that: “HCSP should result in a comprehensive set of human resource management policies and practices that align the structure, culture, and characteristics of the workforce with the organization’s strategic intent.” The strategic intent of the organization is to both identify the “business” of the organization and how that business is to be carried out. Thus, HCSP is strategic in nature and identifies the future desired workforce. In a companion effort, the Department now prepares manpower plans for its AT&L workforce that incorporate the results of human capital strategic planning. Both efforts are attempting to

ensure a future workforce with the right numbers of people with the right skills. OUSD (AT&L) is compensating for the loss of experience as more workforce members reach retirement eligibility by using a marketing and recruiting pilot program. The purpose of the pilot program is to demonstrate the effect of implementing a marketing strategy focused on mid-career private sector employees. It will allow local managers to see how long each step of the recruiting and hiring process takes to help identify points of optimum improvement. It will also showcase some benchmark practices to improve processes and reduce the time it takes to hire. The data collected from the pilot will be disseminated to help managers throughout the acquisition system and form the impetus for other improvements for our Human Resource partners.

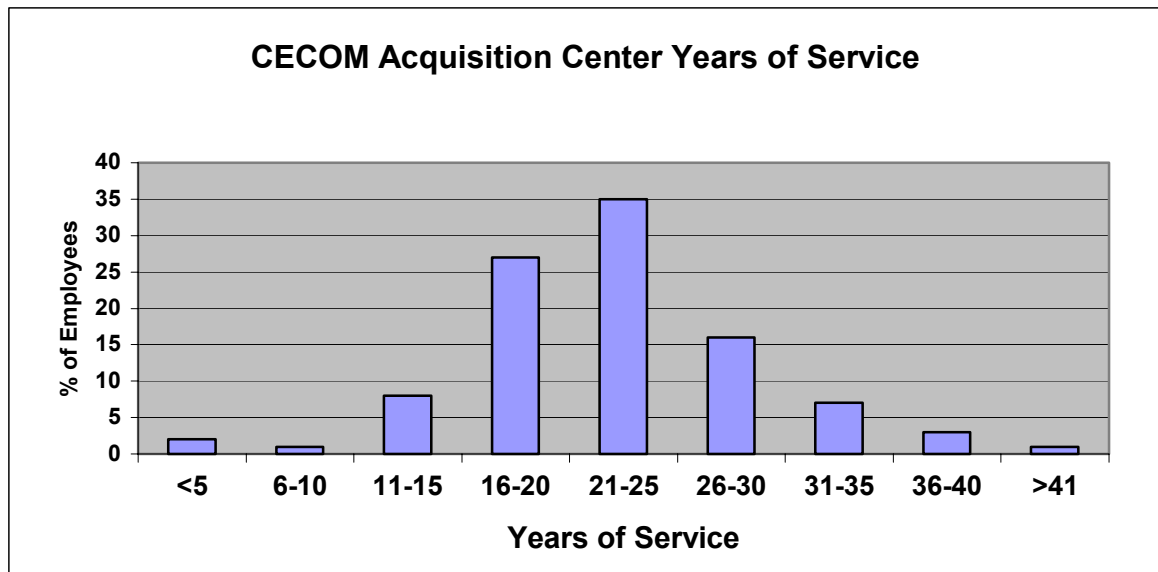
## 2. Internal Environment

The same demographics that are impacting the DoD as a whole are also affecting the CECOM Acquisition Center workforce. From 1990 to the present, the Acquisition Center has experienced a 56 percent increase in the total dollars awarded as well as a 200 percent increase in the number of actions over \$25,000. However, during the same time, employee count decreased by 58 percent, from 1180 to the current level of 485. This is seen in detail in Figure 1 below. [Ref 17]



**Figure 1. Contracting and Personnel Trends**

In terms of retirement eligible employees, the CECOM Acquisition Center could potentially lose 90 percent of its workforce within the next ten years. The years in service chart, Figure 2, shows that the Acquisition Center’s potential losses of experienced personnel due to retirements



**Figure 2. CECOM Acquisition Center Years of Service**

For her Naval Postgraduate School Thesis, Kimberly Frey, demonstrated two important related statistics. First, the largest cohort of DoD employees is over 55 years of age, and 70 percent of all employees are over 46 years of age. Second, there are a small number of employees below the age of 40. Just like the DoD as a whole, the CECOM AC faces a shortfall in the number of younger employees readily available to step into the positions vacated by retiring personnel. [Ref 17]

The Director of the CECOM Acquisition Center, Mr. Edward G. Elgart, is quoted, “During the next five to ten years, there will be tremendous turnover within the Army Acquisition Community. It is imperative that the CECOM Acquisition Center pursues ways by which more experienced but retirement eligible employees can convey some of the vast, experiential knowledge of our veteran acquisition workforce to newly hired, or newly promoted, contracting personnel.” [Ref 18]

### C. THE FOUR PILLARS MODEL OF KNOWLEDGE MANAGEMENT

This section presents information from the literature review regarding the key elements within Dr. Stankosky's four pillars model. Stankosky's model is based on four pillars, or key elements. The four pillars, or key elements are: Leadership, Organization, Technology and Learning. These four pillars represent key elements critical to Knowledge Management programs, where all four key elements form a disciplined systems approach to an integrated framework encompassing all facets of enterprise-wide Knowledge Management programs. Figure 3 is Stankosky's KM model.

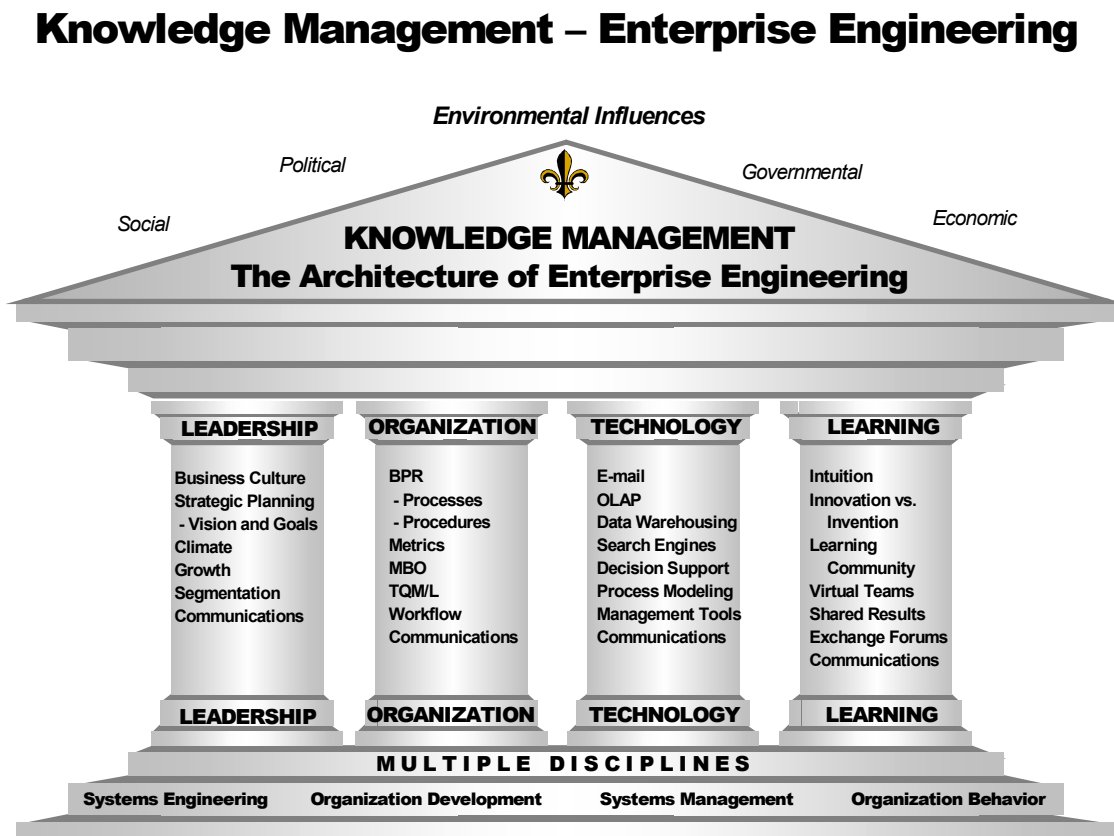


Figure 3. Stankosky's Four Pillar Knowledge Management Model [Ref 9]

## **1. Background**

In 1999, Dr. Francesco Calabrese attempted to prove that the then “fuzzy branch of management science” called knowledge management was not a fad. He began with the premise that managing an enterprise’s knowledge resources can be more effectively achieved through the systematic use of a delineated framework of key elements, which design and implement effective knowledge management programs, processes and initiatives. He explored the four pillars of Stankosky’s knowledge management model through workshops and a limited review of knowledge management literature. Based on his limited study, Calabrese, a) validated the existence of the four pillars, b) expanded on the pillar’s sub-elements, and c) confirmed the disciplines supporting the pillars. While Calabrese concluded that all four pillars were found in the literature and were validated as all necessary by the workshop participants, he expected that the four pillars would be found to co-exist “harmoniously” in relatively four equal parts. Instead, he found that the literature exposed a strong imbalance toward the use of technology and tools for the knowledge management enterprise practices assessed. A further expanded study was conducted in 2000. The study in 2000 again validated the existence of the four key elements, and statistically supported their perceived values and relative importance. Calabrese’s research methodology was a multi-part questionnaire sent to 600 potential participants, and completed by 240 industry and government participants. Responses to the questionnaire captured the respondents’ inputs in the context of their Beliefs, Practices, and Preferences for the four key elements. The results of Calabrese’s research reflected the utility of the four-pillar key element model for use in the assessment and implementation of effective enterprise-wide Knowledge Management programs. [Ref 19]

In addition to analyzing questionnaire results, Calabrese reviewed a number of alternate models of knowledge management from available literature on knowledge management. What follows is a synopsis of knowledge and Calabrese’s review of existing models for knowledge management that were available in CY 2000.

## **2. Knowledge**

The main subject of a knowledge management system is knowledge. A fairly extensive compilation of materials was complied by Drs. Charles Despres and Daniele Chauvet in February 2000. What follows in Figure 4 is a brief summary of the many definitions, descriptions and taxonomies regarding knowledge.

### *Knowledge is:*

1. The cutting edge of organizational success (Nonaka, 1991)
2. The engine transforming global economics (Bell, 1973, 1978)
3. Leading us toward a new type of work with new types of workers (Blackler, Reed and Whitaker, 1993)
4. The element that will lead to the demise for private enterprise capitalism (Heilbruner, 1976)
5. The sum total of value-added in an enterprise (e.g., Peters, 1993)
6. The “mobile and heterogeneous [resource that will end the] hegemony of financial capital [and allow employees to] seize power” (Sveiby & Lloyd, 1987:39)

### *Knowledge Results in:*

1. The “learning organization” (Mayo & Lank, 1995)
2. The “brain-based organization” (Harari, 1994) “Intellectual capital” (Stewart, 1994)
3. “Learning partnerships” (Lorange, 1995)
4. Obsolete capitalist economies and radically different societies (Drucker, 1993)

### *Conclusion:*

Knowledge is fast becoming a primary factor of production (e.g. Handy, 1989, 1994; Peters, 1993; Drucker, 1992)

**Figure 4. Knowledge Definition/Description [Ref 20]**

## **3. Three Pillars Model**

This model uses the term “pillars,” however; the three pillars refer to capturing, appraising, and synchronizing knowledge related activities from a foundation of creating, manifesting, using, and transferring knowledge. This knowledge management model was

not considered by Calabrese to be all encompassing since it did not display a disciplined systems approach. [Ref 2]

#### **4. Peter M. Senge, The Fifth Discipline**

In 1987, the notion of a “learning organization” was considered a fad. Peter Senge changed that notion with his book, entitled *The Fifth Discipline*. Senge identified “...systems thinking, mental models, personal mastery, shared vision and team learning and dialogue as inescapable elements in building learning organizations.” (Senge, 1990). Senge’s “learning organization” is essentially integrated as the Learning key element within Stankosky’s four pillar framework. [Ref 21]

#### **5. Other Models**

No other “model” was discernible as being comparable to the framework postulated by Stankosky. More importantly, no other “model” that surfaced from the literature was structured to take a disciplined systems approach to the integration of a defined framework encompassing all facets of an enterprise-wide knowledge management program. [Ref 19] My review of the literature through CY 2003 validates Calabrese’s conclusion that a comparable framework to Stankosky’s does not exist.

#### **6. Difficulty with Developing a Model**

As Calabrese states:

The vast number of disciplines, best practices, and methodologies that are often haphazardly tied to knowledge management programs create the fad perception. A solution to solve the fad perception is to use systems thinking which is a disciplined approach for seeing the entire system. Systems thinking is derived from systems analysis, systems management and systems engineering. Ultimately it is necessary to conceive, plan, design, test, implement, evaluate, modify and reiterate to seek ideal knowledge management programs composed of systems for: identifying, acquiring, storing, disseminating, communicating, maintaining, updating, modifying and staying abreast of knowledge – the “human faculty” for taking intelligent and timely action on behalf of enterprise goals and objectives. Secondly, systems thinking is also consistent with creating a ‘blueprint’ for use of the four pillar key element framework that can be applied in a systematic and repeatable manner to produce high quality, effective enterprise-wide knowledge management programs. These programs must manage the timely sharing of



pertinent knowledge with the correct decision makers, throughout an ***Organization*** and in concert with the enterprise's strategic and operational visions and goals. To truly succeed, these programs must have the visible support and follow through by the ***Leadership*** of the enterprise, and exist in an environment of open knowledge sharing and ***Learning***, facilitated by the best ***Technology*** tools and methods. [Ref 19]

## **7. Key Elements, sub-elements and Disciplines Associated with knowledge management**

Table 1 delineates key elements, sub-elements and disciplines associated with knowledge management. The depiction in Table 1 adds to the credibility that the knowledge management programs, systems, and initiatives incorporated into the four-pillar framework are firmly based in classically accepted scientific disciplines.

## KM's Disciplines, Key Elements and Representative Key Sub-Elements

### Key Elements&

#### Disciplines

##### *Technology/Tools*

##### Disciplines:

Computer Science  
Computational  
Linguistics  
Operational Research  
Electrical Engineering  
Math/Statistics  
Logic

#### Representative Key Sub-elements

Data Warehousing;  
Database Management SW;  
Multimedia Repositories;  
Group Ware;  
Decision Support Systems;  
Expert Systems;  
Corporate Intranet;  
Speech Understanding;  
Business Modeling Systems;  
Intelligent Agents;  
Neural Networks; etc.

##### *Organizational Culture*

##### Disciplines

Psychology  
Operations Research  
Organizational  
Development  
Philosophy  
Sociolinguistics

Process Workflows;  
Operating Procedures for Knowledge Sharing;  
Business Process Reengineering (BPR);  
Management By Objective (MBO);  
Total Quality Management (TQM);  
Metrics Standards;  
Hierarchical, Centralized or Decentralized;  
Matrix Type Organization;  
Open/Sharing;  
Closed/Power Based;  
Internal Partnering vs. Competing Type Culture

##### *Leadership/Management*

##### Disciplines

Operations Research  
Management Science  
Psychology  
Philosophy  
Logic  
Linguistics  
Management Information  
Systems  
Behavioral Profiling

Strategic Planning  
Vision Sharing;  
Specific and general Goals and Objectives;  
Executive commitment;  
KM program tied to metrics;  
Formal KM roles in existence;  
Tangible rewards for use of KM;  
Knowledge sharing

##### *Learning Enterprise*

##### Disciplines

Cognitive Psychology  
Organizational  
Development  
Systems Engineering  
Management Philosophy  
Personal Mastery  
Mental Models  
Shared Vision  
Team Learning

Tacit and Explicit Knowledge;  
Management support for continuous learning;  
Capturing, organizing and disseminating knowledge;  
Virtual Teams;  
Exchange forums;  
Communities of Practice;  
Innovation encouraged/recognized/rewarded

**Table1. KM Disciplines, Key Elements & Representative Key Sub-Elements**

## **8. Findings of Dr. Calabrese**

Calabrese found through literature review and statistical analysis of the participants' survey responses to paired questions that a) the existence of the four key elements (Leadership, Technology, Organization and Learning) was validated, b) the study identified multiple, recognized disciplines supporting each of the four key elements, c) the study expanded the inventory of key sub-elements under the key elements, and d) it documented a framework of key elements and key sub-elements, which provide a blueprint for a disciplined systems approach to designing and establishing integrated, enterprise-wide knowledge management systems, programs and initiatives. [Ref 19]

### **D. FOUNDATIONAL SKILLS AND SUBJECTS ESSENTIAL FOR ACQUISITION PROFESSIONALS**

This section begins with an historical view of the of the contracting professional and then moves on to the competencies, skills and disciplines required for the current and future contracting professional.

#### **1. Historical View of the Contracting Professional**

Today's environment bears little resemblance to the 1980s. In the 1980s, DoD funding and personnel resources were increasing. Then President Reagan was building America's arsenal to thwart the "evil empire," his telling description of the former Union of Soviet Socialists Republics. The contracting professional's main job was perceived by many to be prescriptive; that is to apply, interpret and quote volumes of statutes, rules, regulations and policies. The ability to read, retain and interpret volumes of data was keys for success for contracting professionals. [Ref 22] Those laws, regulations and policies were also applied more stringently. If the regulations said, "you shall," you did. If the regulations said, "you shall not," you did not. The job of the contracting professional was to fully protect the Government's interest. Contracting professionals back then did that by interpreting contract clauses and regulations and preparing contracts and modifications that benefited the Government. It was perceived by most contracting professionals that industry was interested in profit, and only in profit. The contracting

professional earned his or her living by ensuring that industry did not have an advantage over the Government.

Contracting professionals were not necessarily skillful or knowledgeable in market research, nor did they have general knowledge or experience with the marketplace. The human relations knowledge skills were not necessary to be a successful contract specialist. Many contracting officers and contract specialists were not skilled negotiators, which is difficult to believe since negotiation has always been a major part of a contract professional's job. Where the contracting professional always had the power to influence contractors, they used their influence based on reliance on the stringent application of the regulations and policy that supported their position. Contracting Officers are the only Government officials with the authority to bind the Government.

While the above generalizes the contracting professional's past position, it is not intended to infer that all contracting personnel from the 1980's lacked the skills required by today's contracting professional. What should be understood is that the contracting professional of the 1980's required a limited skill set.

## **2. Competencies, Skills and Disciplines Required by Contracting Professionals**

Today's Contracting Officer/Specialist and those of the future require an expanded set of competencies, skills and disciplines to be successful in the changing field of acquisition. The emphasis today is not on regulations and prescriptive measures to apply the regulations, but innovation or innovative uses of the regulations. The contracting professional is not expected to be the last line of defense against profit-motivated industry. Instead, today the contracting professional needs to be a facilitator, team leader, and, when appropriate, team member. The ability to understand business practices and management techniques are skills required of the modern contracting professional. No longer is the "us against them" mentality; and win-lose outcome the rigueur of the day. The ability to deal with shrinking resources while workload increases, means greater emphasis on communication skills, more involvement in the early stages of the acquisition process, an ability to manage, and not just police, and the ability to transfer knowledge to entry level employees is critical skills necessary for today's

contracting professional. A contracting professional who is educated and skilled in the disciplines of the commodities and services they purchase can provide a more efficient process and better understand the nuances of emerging business techniques. That person is someone who will be successful in the current and future high-pressure career of acquisition.

The future contracting professionals need to possess the correct skill sets in order to assume the responsibility for purchasing and negotiating materials, equipment, and supplies from a variety of world wide diversified vendors. They must have a thorough understanding of the supply chain management function and inventory control systems. The ability to apply sound business judgment in compliance with applicable regulations is an absolute requirement for the future success of Government acquisition. The future contracting professional must have the ability to utilize systems thinking because it is ultimately necessary to conceive, plan, design, test, implement, evaluate, and modify the processes to obtain the best-value deals for the end user – the warfighter. It is not good enough to just analyze market conditions and develop procurement strategies that reduce total life cycle cost and improve quality of incoming goods. They must be able to establish processes and teach the next generation to determine the most desirable, and best value, suppliers among the competition. That is a difficult task since each vendor has both strengths and weaknesses and each entry-level employee has different initial skill sets. By improving and honing these skills and abilities, the contracting professional will be better equipped to accomplish the mission for the ultimate benefit of the warfighter of today and tomorrow. The most important long-term benefit is for current and future contracting professionals to share their knowledge within their community. Sharing knowledge will shorten the time for new employees to learn new skills and will allow professionals to collaborate and innovate better solutions.

The National Contract Management Association (NCMA) has identified three broad contract management competencies, or areas of knowledge that can be enhanced through continuing education and developed through practice. In their published “Guide to the Contract Management Body of Knowledge (CMBOK) 1<sup>st</sup> Edition” released in September 2002, NCMA identified technical, conceptual and human relations knowledge as keys to be a successful contract manager. Technical knowledge is demonstrated

through day-to-day accomplishment of specific contract management tasks, like preparing contracts and modification, analyzing contract terms and conditions, and analyzing customer requirement and supplier capabilities. According to NCMA technical knowledge is obtained and enhanced through completion of degree programs, certificate programs, professional continuing education and specialized programs. Conceptual knowledge relates to how well the contracts professional visualizes the contract organization in terms of organizational goals. According to NCMA, conceptual knowledge is the ability to visualize the big picture, articulate global concerns and act toward the attainment of organizational goals. Note, however, that NCMA did not identify methods to acquire conceptual knowledge. Human relations knowledge focuses on the interpersonal aspects of contract management. This competency reflects itself in generating cooperative relationships between the entire team; from the multiple disciplines within DoD to include the suppliers. Generating the cooperative working relationships requires strong communication skills.

Entry level contracting business managers must have familiarity with a variety of the procurement concepts, practices and procedures. Each entry-level business manager will have to rely on personal experience and judgment to plan and accomplish organizational and customer goals. However, the rationale for their decisions and the processes they use should be rooted in a disciplined approach. The future business manager will need to perform a variety of complicated tasks within an environment where a wide degree of creativity and latitude is necessary and expected. The knowledge and skills that will allow the future contracting professional to perform the above outlined tasks are divided into four cascading categories, (1) general business skills, (2) foundational, or core acquisition competencies, which include the foundational disciplines that underlie those competencies and (3) task level competencies. [Ref 10]

### **3. General Business Skills**

General business skills are the generic skills, which individuals need in order to be members of a flexible, adaptable, and competitive workforce. Without these generic business skills members are virtually unqualified to operate successfully in a business environment. These are the skills that are absolutely necessary to promote life long learning since they form the basic building blocks for all other specialized skills. This

study has reviewed the six key general business skills identified by Kimberly Frey in 2001 and believes they are still valid. [Ref 18] The six general business skills include the following:

- Communication skills both verbal and written;
- Application of numbers consisting of the ability to apply mathematics and statistics;
- Information technology and computer competency;
- Working with others involving teams, customers, and competitors;
- Financial analysis consisting of accounting, economics and finance;
- Problem solving to include locating, analysis, and providing solutions.

A quote from Kimberly Frey's Thesis, entitled: " The Changing Face of the Contracting Professional in the Department of Defense" follows:

Other organizations echo these identified skills and suggest other necessary general business. The National Association of Purchasing Management's Center for Advanced Purchasing Studies, Lehigh University conducted a survey of 700 chief purchasing officers of large U.S. firms. The following skills for purchasing professionals were deemed "must haves": interpersonal communication, customer focus, decision-making ability, analytical and negotiation skills, conflict resolution skills, flexibility, problem-solving skills and the ability to influence and persuade. [Ref 23]

#### **4. Foundational or Core Acquisition Competencies**

Foundational acquisition competencies listed within NCMA's CMBOK are broad areas of knowledge, which encompass contracting principles, acquisition planning and acquisition strategy, contract administration, specialized knowledge, and general business. General Business includes management, marketing, operations, accounting, economics, quantitative methods and finance. Underlying those broad knowledge areas

are the disciplines of operations research, logic, psychology, philosophy, sociolinguistics, management science, management information science, organizational behavior, and management philosophy. In order to exercise good business judgment within the acquisition field, members require several additional core acquisition skills. As a profession, the acquisition field contains a unique body of knowledge, which must be mastered. It should be highlighted that without the necessary general business skills, the foundational competencies skills could not be developed, let alone utilized in the performance of one's duties. Core acquisition competencies are developed into skills and skills give an individual the ability to perform their day-to-day tasks in the acquisition field in order to conduct DOD business in the manner that is critical to achieving best-value acquisitions while simultaneously serving all stakeholders. Core acquisition skills further serve as basic building blocks to obtaining advanced and specialized acquisition skills. In addition to the foundational competencies addressed by NCMA, presented below are a few also important skills necessary for the contracting professional of today and the future:

- An understanding of the principles of supply chain management;
- A grasp of the fundamentals of project management including trading off risk, cost, quality, and timeliness through cost/benefit and tradeoff analyses;
- An understanding of how to work in high-performance teams;
- Knowledge of the fundamentals of defining requirements;
- Competency at working with information and abstract concepts.

## **5. Subject Matter Competencies**

Cascading from the foundational competencies NCMA defines subject matter competencies as a subset of the foundational competencies. These are the knowledge



areas that contracting professionals need to know and demonstrate to be effective in daily activities. To illustrate an example of the cascading from foundational competencies to subject matter competencies the foundational competency contracting principles is cascaded into subject matter competencies. [Ref 10]

#### Contracting principles

- Standards of conduct

- Laws and regulations

- Socioeconomic

- Contract structures

- Contracting methods

- Contract financing

- Intellectual property

### **6. Task Level Competencies**

Further cascading from the subject matter competencies NCMA defines task level competencies as a subset of subject matter competencies. These are the more specific knowledge areas that contracting professionals need to know and demonstrate to be effective in daily activities. To illustrate an example of the cascading from subject level competencies to task level competencies the subject matter competency standards of conduct is cascaded into task level competencies. [Ref 10]

#### Standards of Conduct

- Ethics

- Conflict of Interest

- Improper Practices

## **E. CHAPTER SUMMARY**

This chapter laid the foundation for a Knowledge Management Model. It also identified foundational subjects, essential to the acquisition professional as well as the skills and competencies of those professionals. The source of this knowledge was through literature examination. The chapter began with an examination of the environment, both external and internal, and then the four-pillars model of Knowledge Management, which included Leadership, Organization, Technology, and Learning. The chapter ended with the disciplines and competencies required for contracting professional of today and the future as well as the foundational subjects and skills essential to acquisition professionals.

## **IV. KNOWLEDGE MANAGEMENT SYSTEM MODEL**

### **A. INTRODUCTION**

The elements of a Knowledge Management System are discussed within this chapter. This Knowledge Management System is developed for the CECOM Acquisition Center; however, this is a model that, hopefully, can be applied to any DoD procurement organization that has a similar mission. The model chosen to implement knowledge management is based on the model developed by Dr. Michael Stankosky. There are four basic elements within Stankosky's Knowledge Management System model: (1) delineating the environment, (2) designing in Stankosky's Four Pillars, (3) determining the measurable core strategic objectives, and finally, (4) determining process flows. When properly designed, the output should be a Knowledge Management System that fits the culture and supports the organization's mission objectives. What follows is a more in-depth understanding of the four elements. [Ref 9]

### **B. THE ENVIRONMENT**

The first step is to delineate the environment of the organization, both external and internal. Chapter III fully explored the external and internal environment and is not repeated here. Instead, a summary of the external and internal environments is presented.

#### **1. External Environment and Influences**

The external environment is everything outside the organization. Beginning with the big picture, the United States is fighting a war on terrorism. While fighting this war, the United States continues to strengthen its defense posture to protect the nation's interests, and to assure its lead role in global affairs through transformation of the military. The United States is developing and fostering new and innovative technologies that will ultimately support the war fighter. These technologies are developed and then integrated into current and future weapon systems developed and fielded by Program Executive Officers within the Armed Forces. Delay in developing or fielding new innovative technologies can jeopardize war fighters' lives. Most of today's Army weapons use Commercial Off the Shelf (COTS) technologies and adversaries are extremely capable of using the same COTS technologies to defeat last year's weapon.

Compounding the problem of rapidly developing and fielding new technologies is the reduced quantity of acquisition workforce employees. Fifteen consecutive years of downsizing, base realignments and closures, budget reductions, and an aging workforce have significantly changed the overall DoD civilian workforce. The current DoD workforce is unbalanced by age and experience and that puts orderly transfer of institutional knowledge at risk.

To address this potentially difficult situation, the Offices of the Under Secretaries of Defense for Personnel and Readiness and Acquisition, Technology, and Logistics recommended 31 initiatives in the areas of human capital strategic planning, recruiting and hiring, career development, workforce management and quality of life. AT&L put a major thrust behind human capital strategic planning and initiatives or actions to “shape” the workforce for the future through gap reduction. The General Accounting Office (GAO) affirmed that DoD has moved forward in laying the foundation for shaping the future workforce. Several of the initiatives and best practices are integrated into the Acquisition Workforce Civilian Personnel Demonstration Project. On 7 November 2003, Congress passed the FY 2004 National Defense Authorization Act, which authorized a new personnel management system for the entire Department of Defense to cope with the human capital challenges of the future. In addition, the Defense Acquisition University (DAU) is modernizing and reengineering training for the critical career fields of contracting and program management. At the same time, DAU is also preparing to add new training for sustainment, technology management, and facilities engineering, as well as continuous-learning training to keep knowledge and skills up-to-date. OUSD (AT&L) continues to work to institutionalize human capital strategic planning for DoD Acquisition, Technology, and Logistics (AT&L) workforce. In October 2002, USD (AT&L) issued a policy memorandum that established an annual Human Capital Strategic Planning (HCSP) process that should result in a comprehensive set of human resource management policies and practices that align the structure, culture, and characteristics of the workforce with the organization’s strategic intent. In a companion effort, the Department prepares manpower plans for its AT&L workforce that incorporates the results of human capital strategic planning. All efforts are attempting to ensure a future workforce with the right numbers of people with the right skills.

## **2. Internal Environment**

The same demographics that are impacting the DoD as a whole are also affecting the Communications Electronics Command (CECOM) Acquisition Center workforce. Over the last 13 years, the workload increased 150 percent, while the workforce count decreased by 68 percent. Considering that baby-boomers will be retirement eligible during the next ten years, the CECOM Acquisition Center could potentially lose 90 percent of its workforce. No one can predict the actual workload over the next ten years, other than to state that a reduction is unlikely given the President's goal to transform the military into a more lethal and agile force. The bottom-line is that the CECOM Acquisition Center faces a major shortfall in the number of younger employees readily available to step into the positions that will be vacated by retiring personnel. A tremendous turnover within the CECOM Acquisition Center is expected and it is imperative that the CECOM Acquisition Center pursues ways by which more experienced employees can convey some of the vast, experiential knowledge to newly hired, or newly promoted, contracting personnel.

### **C. STANKOSKI'S FOUR PILLARS OF KNOWLEDGE MANAGEMENT**

The four enterprise engineering pillars are leadership, organization, technology, and learning in support of enterprise-wide KM initiatives. The pillars represent critical success factors for KM implementation. To achieve a basic entry level KM program, all four pillars must be addressed. Below is each pillar's application for the CECOM Acquisition Center. [Ref 19]

#### **1. Leadership**

The purpose of this Leadership pillar is that it develops business and operational strategies to survive and position the organization for success in today's dynamic environment. Given the CECOM mission, the strategies chosen determine vision, and these strategies must align knowledge management with business tactics to drive the value of knowledge management throughout the enterprise. Leadership establishes and implements the strategy that is supposed to nourish the climate and culture. Because leadership interacts with the environment to position itself for success, Knowledge Management Systems require leaders who are strong proponents of the Strategic Plan and

are dedicated to meeting and exceeding the organizational goals. The climate of the CECOM Acquisition Center is accurately described in the internal and external environment and is not repeated here.

The strategic plan for the CECOM Acquisition Center is a cause and effect story that starts with Mission and Vision. The Mission of the CECOM Acquisition Center is: “To provide customers valued added business solutions that support America’s War fighters.” The vision of the CECOM Acquisition Center is: “To be the Acquisition Center of Choice where innovative people provide optimal solutions to meet the needs of customers for America and its Allies.” (CECOM AC Strategic Plan, 2001) Given the mission and vision statements, an organization needs to articulate its value propositions to its customers. A value proposition is a set of benefits offered to customers that are consistent with the organization’s goals and gives the organization and its customers the competitive edge. In other words, a value proposition is the organization’s message that answers the question, what does the name “CECOM Acquisition Center” send to a customer that will make it choose to do business with them over their competitor? It’s those value propositions of the organization that make it superior. Through the Appreciative Interview process conducted in the Spring of 2000, the CECOM Acquisition Center found its three main strengths, or value propositions, were: innovation, performance and relationships. A brief description of each value proposition is below.

- Innovation – Numerous and evolving acquisition vehicles providing flexibility, speed and total solutions
- Performance – Consistent and predictable execution of customer requirements that are responsive and procedurally correct
- Relationships – Accessibility, responsiveness and positive relationship management through the life of the partnership

Customers told the Acquisition Center they wanted the CECOM Acquisition Center to be flexible and fast, and they wanted the job done right the first time. Innovation is one of the value propositions that allow an organization to do that. The “consistent and predictable” portion of performance reflects an organization’s

commitment to providing the same level of superior performance no matter which contracting officer or specialist is providing the service. The customers said they wanted the CECOM Acquisition Center to respond to their needs and they didn't really care how it was accomplished as long as it was transparent to the customer. Customers wanted close working relationships, and positive relationship management can develop those close working relationships.

*a. Strategic Themes*

To implement the value propositions, five important strategic themes were chosen: (1) Communications, (2) Talent Management, (3) Process, (4) Knowledge Management, and (5) Partnerships. Each of the five themes has a strategic initiative associated with it, which essentially, defines or explains that strategic theme.

- Communications – Strategic Theme: “Leverage communication practices with all shareholders to foster an informed and innovative atmosphere.”
- Talent Management - Strategic Theme: “Create and implement a talent management approach to ensure performance in a dynamic environment to deliver the optimal solution for every stakeholder and shareholder.”
- Process – Strategic Theme: “Develop a process driven culture and optimize key processes to drive efficiency, quality and business ease.”
- Knowledge Management – Strategic Theme – “Manage information, knowledge and expertise to optimize the competitive advantage of the Center and its customers.”
- Partnerships - Strategic Theme: “Ensure a results-oriented environment by developing collaborative relationships among stakeholders.” [Ref 24]

In the 21<sup>st</sup> Century, how can an organization build and implement an effective strategic plan? One proven method, utilized by forty percent of Fortune 1000 companies, is to measure its strategies utilizing a balanced scorecard approach. This is a performance measurement tool developed in 1993 by Robert Kaplan and David Norton of the Harvard Business School. [Ref 25] Balanced Scorecard has been used successfully in both profit and non-profit enterprises. One of the advantages of the Balanced Scorecard approach is that it provides a methodology that builds upon the foundation below it- one building block at a time. It allows the Chief Information Officer or, in the CECOM Acquisition Center's case, the Director to manage business strategy and guide overall performance by measuring the impact of activities on selected externally and internally focused categories. The executive team, which consists of the Director, Deputy Director and all GS-15 Sector Chiefs, selected four categories to balance the strategic plan: Learning and Growth, Process, Customer and Financial. These categories build upon one another from the foundational themes of Learning and Growth and Process. Learning and Growth deals with people, while Process deals with systems, procedures and structures. The Customer category relates to applying the organization's value propositions for customers. Finally, Financial which deals with the CECOM Acquisition Center's rewards for doing things better, cheaper, faster for customers. The CECOM Acquisition Center and its customers both gain competitive advantages through collaboration. Savings achieved by doing things better, cheaper, faster can be plowed back into infrastructure improvements. [Ref 26]

Starting from the foundation and working through the Cause and Effect story, the strategies tell the steps that the Acquisition Center is pursuing and the purpose of each strategy.

***b. The Cause and Effect Story***

By promoting effective communication and collaborative behaviors it means that the organization is using systematic processes and practices, which foster communication to and from all levels. By achieving a systematic process flow, information vital to the organization will continue to improve. The culture that the CECOM Acquisition Center strives for is an atmosphere of trust and free from retribution. By pursuing free flowing communications, it supports and builds a culture,



which supports and celebrates innovation, collaboration and performance. By supporting and celebrating innovation and performance it means that the organization is formally and informally recognizing employees at all levels, both internally and externally, for their contributions to the CECOM Acquisition Center, CECOM and the Army. When the foundation is fully developed, it will enable the organization to systematically communicate relevant and multidirectional information and provide a means of feedback. That means that organizational practices and processes are established, which provide an open exchange of information, through multiple, established channels of communication to provide feedback, which further means that continuous process improvement practices provide the workforce with access to a knowledge repository of current and accurate information with meaningful incentives for the workforce to share value added, context relevant data and experiences. Building on the foundation of communication and knowledge management, it's important for an organization to add vibrancy to the most vital of all assets in every organization - the entire workforce. Addressing the needs of the workforce today as well as in the future is the focus of the next strategy: Retain, Promote and Recruit Individuals for the Future State Workplace. With knowledge gained through the communications process, CECOM Acquisition Center's personnel processes are further refined and developed to establish a recruitment and retention program responsive to the organization's changing needs. Core processes are designed and infrastructure developed. Another key element within the CECOM Acquisition Center strategic plan is to grow the internal Enterprise Learning Center to maximize organizational performance. An enterprise solution that gauges the current state of the workforce, anticipates their future needs and equips them with the unique knowledge, skills and abilities necessary to be the business professionals of choice, decreases time to deliver goods and services; provides consistent and flexible solutions for customers; optimizes quality of customers' experience, and translates into understanding customers' desired results.

Through continual collaboration and feedback with customers, and through anticipation of customer needs, the Knowledge Management strategy employed by the CECOM Acquisition Center retains and attracts customers by finding solutions to help them execute their mission. The CECOM Acquisition Center and its customers

achieve an understanding of common expectations and desired results through development and enhancement of knowledge and expertise. An organization that employs a knowledge management strategy performs effectively and efficiently by leveraging the workforce's intellectual capital to meet the acquisition professional's need for immediate access to current, relevant and useful information. Knowledge management strategies provide cumulative knowledge to develop solutions. When properly and consistently executed, organizations are more likely to improve their business solutions for customers and to help them meet their challenges. Employing a knowledge management strategy also builds loyalty and trust because the customer has confidence in the organization's expertise. Customers that have loyalty and confidence continue to return and promote the CECOM Acquisition Center to other customers.

Promoting effective communication with external partners maintains effective channels of communication with headquarters, other Services, customers, and industry to facilitate a mutually beneficial understanding of missions and collaborative behaviors. The CECOM Acquisition Center maintains open dialog with stakeholders outside the Acquisition Center by identifying and developing types and classes of partnerships. They include partnership arrangements with all stakeholders from informal to formal relationships. Developing close working relationships eliminates the possibility of adversarial conditions. It also cultivates a mastery of account management and customer care. The CECOM Acquisition Center has formally developed an External and an Internal Customer Representative for each customer. The job of the external customer representative is to understand and plan for the customer's work efforts for the next four fiscal quarters. The external representative is the customer's focal point into the CECOM Acquisition Center, sort of like one-stop shopping. The job of the internal customer representative is to execute the individual work efforts identified by the external representative through the individual efforts of contracting officers and specialists. The CECOM Acquisition Center also implemented a Joint Partnering Contractor (JPCs) representative for its largest contractors. JPCs focus their efforts on the largest contractors from a Strategic Alliance standpoint, which mean the contractors that are consistently in the top five positions in terms of awards year after year. Together the Customer Representatives and JPCs increase the level of satisfaction for both internal and

external partners. This is accomplished by keeping abreast of Acquisition Reform initiatives, training, technological changes in the customer's business environment, which in turn requires development of innovative solutions, which result in strengthened partnerships. By developing alliances and coalitions with internal and external partners and remaining organizationally flexible to accommodate changes in customer needs, the CECOM Acquisition Center provides value through customer account management agility, which in turn maximizes customer satisfaction and loyalty. Building long-term strategic alliances with partners by providing consistency throughout the workforce, results in high quality business solutions for partners. By accomplishing those strategic initiatives, the CECOM Acquisition Center develops opportunities to maintain and increase direct funds for common level support, while gaining cost efficiencies through the use of knowledge partners, thereby becoming the Most Efficient Organization (MEO). Through collaborative alliances with knowledge partners and increasing revenue growth for infrastructure investment when resourcing allows, the CECOM Acquisition Center seeks and develops new reimbursable arrangements without degradation with existing alliances. Return on investment is realized through improvements in automation tools and training for the workforce, which reduces transaction cost for each acquisition action.

*c. The Strategic Theme View*

It is also important to look at a strategic plan by viewing each of the five strategic themes. In a performance driven organization, the employees communicate effectively and share collaborative behaviors, they celebrate innovation and performance successes. Once that foundation is laid, key processes can be developed and optimized. All employees are part of the organization, which designs processes and infrastructure. These key processes become routine within the CECOM Acquisition Center, which leads to the utilization of resources in a most efficient manner. The result is that it leads to a decrease in the time it takes to deliver goods and services. As a result, consistent and flexible solutions are provided to the customer and the quality of the customers' experience is improved. That will, in turn, reduce transaction costs and lead to a consistent revenue stream for common level support.

The foundation of Knowledge Management also begins with communications and talent and resource management themes. The most basic strategy is to understand customer needs. Implicit in this strategy is understanding of customers' needs, as they are today and the not too distant future and building on that understanding. With the knowledge of customers' needs, CECOM Acquisition Center establishes the right training and development, with the right retention and recruitment processes for today and the future. It is believed that people with the right skills will enhance, develop and support innovation and collaboration and improve performance. CECOM Acquisition Center can celebrate and communicate these improvements internally and externally, and by doing so will be adopting a strategic culture.

*d. A Strategic Culture*

In its simplest terms it means that every employee understands how his or her daily activities contribute towards the long-range vision of being that Acquisition Center of Choice. Built on the foundation of strategic culture the Acquisition Center develops and enhances collective use of knowledge and expertise through business systems that enhance innovation and productivity. With the systems, knowledge and expertise harnessed, CECOM Acquisition Center provides customers, shareholders and partners optimal solutions. That, in turn, builds customer loyalty and trust through the confidence customers have in the CECOM Acquisition Center's expertise. The goal is to allow CECOM Acquisition Center to utilize resources more efficiently saving people time, which allows them to accomplish more complex work, which satisfies even more customers and fulfills the CECOM Acquisition Center vision – be the Acquisition Center of choice.

Starting with the Communications and Talent Management Strategic themes as the foundation – the Partnership theme also begins with understanding customers' needs and ensuring that CECOM Acquisition Center clearly define and implement the customer representative role. With the customer representative role clearly defined, more effective communications with partners will result. It also means identifying and developing types and classes of partnerships and how, when and where to use them. The result is strengthened partnerships and relationships with shareholders and stakeholders, which improves customer loyalty. Greater customer satisfaction results

from these enhanced arrangements with partners. Ultimately, the result will be cost efficiencies and increased revenue growth for infrastructure and intellectual investments.

A strategic plan is the starting point for any organization trying to implement a knowledge management system. Additionally, the strategic plan needs to be fully encompassing, and developed based on the mission, vision and value propositions of the organization. From the above strategic plan, CECOM Acquisition Center developed a fully encompassing plan where goals were set that take into consideration the climate, culture and environment that exists.

## **2. Organization**

The value of knowledge creation and collaboration need to be intertwined throughout an enterprise. The organizational structure must support strategy. Operational processes must align with the knowledge management framework and strategy, including all performance metrics and objectives. While operational needs dictate organizational alignment, a knowledge management system must be designed to facilitate knowledge management throughout the organization. Operational processes must be aligned with the vision while redesigning the organization and identifying key levers of change, including roles and responsibilities. Introducing knowledge management requires organizational change, and knowledge management inevitably acts as a catalyst to transform the organization's culture. The increasing value placed on highly capable people, rising job complexity and the universal availability of information on the Internet are fundamental changes contributing to the move by organizations to leverage knowledge management solutions. In order to begin changing the organization, knowledge management must be integrated into the business processes. The right business processes and performance management systems must be strong enough to deal with turbulence yet flexible enough to adapt to change.

The organizational structure of the CECOM Acquisition Center was changed in 1998, again in 2002 and again in 2003. All three changes in organizational structure were necessitated by the implementation of the five themed strategic plan to enable alignment of organizational goals with a structure that could implement those goals. A brief explanation of the changes follows. In consideration of the volume of work and the

effects of downsizing it was recognized that the stove piped organization that existed for at least 20 years leading up to 1998 could no longer deliver the services expected by customers. The organizational structure that existed before 1998 was a traditional divisional structure with branches. Employees that worked in one branch only performed efforts for the customers of that branch. While employees gained tremendous experience working with one or two customers, the organizational structure was inefficient. Customers' work was generally cyclical in nature. The command considered collocating specialists and contracting officers with PM offices, but that idea was flawed for two reasons: (1) collocating employees with PMs requires more employees, not less and the trend was toward less employees, and (2) breaking apart a homogeneous group to work in PM offices discourages the contract specialist and contracting officer from pursuing greater levels of knowledge within their field. PMs would tend to ask the GS-1102s to perform non-1102 work whenever there was an opportunity.

Moreover, collocation exacerbates an already dire condition. Program Managers (PMs) generally use Army Procurement Appropriations (APA) funds to execute their programs; PMs press the CECOM Acquisition Center to award before the end of each fiscal quarter, with additional emphasis near the end of the fiscal year, which is 30 September. During the balance of the year, demands from PMs are lighter. The pattern for CECOM Acquisition Center's other major customers, the CECOM Logistics Readiness Center and the CECOM Research and Development Center, did not follow the same quarterly pattern as PM customers, although they press just as hard for the CECOM Acquisition Center to accomplish their work on a timely basis too. The Logistic Readiness Center uses mainly Army Working Capital Funds (AWCF) to execute its mission. Since AWCF funds do not expire at the end of fiscal years, the Logistic Readiness Center mission occurred throughout the year and pressure is applied based on shortages in any of the 60,000 National Stock Numbers managed by the CECOM Logistics Readiness Center in the field. The CECOM Research and Development Center accomplishes its mission using mainly Research and Development funding, which has a two-year life, so pressure is applied in a more controlled way. The organizational structure change in 1998 eliminated the stovepipe organization and made the entire CECOM Acquisition Center a "straight line" organization; meaning that employees could

be moved where and when needed between divisions and branches without personnel actions (i.e., an SF-50). The benefit to the CECOM Acquisition Center was that the organizational structure change created “pools” of contracting officers and contract specialists. No longer did the work migrate to the branch that was formerly responsible for that customer. Instead, Sector Chiefs (the new name for division chiefs) assigned the work wherever there was capacity. By making that change, the old branch structure was eliminated and employees were monitored to ensure that there was an equal distribution of work. The 1998 organizational change also established the customer representative position and the Joint Partnering Customer representative position. The difficulty with the new organizational structure that was created in 1998 was that employees from many branches had depth of experience with that branches’ work, but lacked a breadth of experience with diversified customers and diversified contractual instruments. Secondly, the customer representatives were the supervisors that were responsible for ensuring that the employees without the specialized experience necessary to complete their new assignments with quality and timeliness and it was difficult to service customers while ensuring that Acquisition Center employees received enough on-the-job training to fulfill their new diversified assignments.

After four years of maintaining the 1998 organizational structure, a change was needed in 2002. No longer could customer representatives be expected to care for the customer and the employees without something falling through those ever-present cracks. The 2002 organizational structural change was necessitated by the implementation of the strategic plan to enable alignment of organizational goals with a structure that could implement those goals. While not as dramatic a change as in 1998, nevertheless, structurally it had an impact. In 2002, the CECOM Acquisition Center felt that customer representatives could not meet customer expectations usually at PM offices while being responsible for the transfer of knowledge to the members of the workforce at the CECOM Acquisition Center. It was felt that to do justice to all their customers, each customer representative had to be free to be with their assigned customers more than 60 percent of the time. Between 1998 and 2002, all customer representatives had supervisory responsibilities for employees and they also had to ensure contracting officers and contract specialists were completing the work back at the office. A customer

representative was responsible to ensure that each contract action was the right contractual instrumental for the effort, had the requisite quality and was completed on a timely basis while physically in another building. The change in 2002 brought about internal and external customer representatives. Splitting the single customer representative role enabled one external GS-14 to concentrate almost exclusively on the customers while the internal GS-14 concentrated on the efficient and compliant prosecution of the work and supervisory responsibilities.

The change in organizational structure for 2003 was an attempt to position the CECOM Acquisition Center to succeed in the future. With the retirements of 80 employees in FY 2002, it became imperative that the Acquisition Center hire as many employees to fill vacancies as possible. Due to the location of Fort Monmouth, in a high cost area, job opportunity announcements resulted in very few outside candidates. The candidates that applied were all looking for promotion opportunities. The CECOM Acquisition Center promoted many, but the total civilian count remained constant. The CECOM Acquisition Center was fortunate that Army Materiel Command received funding to hire additional Distinguished Honor Graduates for the Department of Army (DA) intern program. Based on the need and available funding for local interns, CECOM Acquisition Center added 45 new interns during the first quarter of FY 2004. Training 45 new contract specialist interns in two years to be fully functioning GS-11 contract specialists in an organization that has only 404 employees is challenging. A change in organizational structure was needed. In the past, a single first year intern and a single second year intern were assigned to seasoned contracting officers. The contracting officer had the responsibility to give the first year and second year interns all the contractual experiences that could be had from that team during their one-year assignment. At the end of a year, the first year intern would rotate to another Sector, be assigned to a different contracting officer, who had a completely different workload and the new contracting officer had the responsibility of giving the now second intern all the contractual experiences that could be had on that team during the one year assignment. The second year intern was then placed in a permanent assignment with a completely different Sector and contracting officer. With 45 new interns, however, it was impossible for every one of those 45 new interns to receive specialized attention from contracting



officers. To address this challenge the CECOM Acquisition center put all 45 new interns in one Group and provided four seasoned instructors to provide intense training. Having provided this type of intense training to a previous group of nine new interns, the CECOM Acquisition Center was confident that this intense initial training, the equivalent of CON 100 and CON 101, should take no more than eight full weeks. At the end of eight weeks, the new interns will be assigned to the three buying sectors located at Fort Monmouth for more intensive training that should last for an additional ten months. The 45 new interns will not be assigned to individual contracting officers for their training since the number of interns per sector will overwhelm the contracting officers per Sector. Instead, the group of 15 interns per sector will stay together under the auspices of one contracting officer and one seasoned contract specialist. What is different about this new structure is that the seasoned contracting officer and specialist will be relieved of all their normal work in order to concentrate and devote the next ten months to giving each of the 15 new interns the experiences necessary to be a fully functioning GS-11s by the end of the intern's first year of internship.

Structurally, the CECOM Acquisition Center will not appear very different from its current structure and reporting chains. However, within the structural change, the culture of the organization is by necessity dramatically changing. Also changing is the workflow. In order to provide 45 interns with the experiences of a fully functioning GS-11, dramatic shifts in the distribution of work is required. All less complex actions, like funding actions, spares buys, delivery orders, simplified acquisition purchases, broad agency announcements, invitations for bid, etc., will be funneled to this group of 45 new interns. The contracting officers assigned to train the new interns along with the customer representatives for these actions will need to monitor all contract actions closely to ensure the requisite quality and timeliness goals are met throughout the ten month period as the new interns gain skills, expertise and experience. Additionally, realize that the metrics that were established to meet customer expectations are not suspended just because an intern is assigned to an action. Secondly, the regular workforce must adjust to a new method and process for training interns. Instead of having a contracting officer teach a maximum of two interns, there will be three contracting officers and three contract specialists exclusively training 45 interns.

In summary, a flexible organizational structure is a necessity for any organization trying to implement a knowledge management system that can be strained and stressed due to retirements and new hires. The organizational structure needs to be fully encompassing, and developed based on the mission, vision and value propositions of the organization. From the above organizational structure, CECOM Acquisition Center has developed a fully encompassing structure where goals were set that take into consideration the climate, culture and environment that exists.

### **3. Technology**

Technology enables and provides all of the infrastructure and tools to support knowledge management within an enterprise. While cultural and organizational changes are vital to achieving a knowledge management strategy, a lack of proper tools and technology infrastructure can lead to failure. Any technical solution must add value to the process and achieve measurable improvements. Properly assessing and defining Information Technology capabilities is essential. The Gartner Group defined ten technologies that collectively make up full-function knowledge management. The functional requirements that enterprises can select and use to build a knowledge management solution include: [Ref 27]

- Capture and store
- Search and retrieve
- Send critical information to individuals or groups
- Structure and navigate
- Share and collaborate
- Synthesize
- Profile and personalize
- Solve or recommend
- Integrate with business applications
- Maintain critical information

Currently, no technology product meets all ten functional requirements. Therefore, before selecting a solution, enterprises need to clearly define their KM strategy, scope and requirements, and perform product evaluations to identify technology products that effectively meet most of them. The CECOM Acquisition Center is no different than most other organizations. Many of the systems used are stand alone systems and do not easily interface with one another. In its infancy is the Army's Logistics Modernization Program. The Logistics Modernization Program (LMP) contract requires that the contractor, Computer Sciences Corporation (CSC), provide for the transfer of expertise, workload, software, and documentation associated with sustaining the Army's entire Logistics Management System. The undertaking is unprecedented in that the job modernizes the Information Technologies of the logistics management systems throughout the Army. The Army Materiel Command (AMC) LMP Corporate Board of Directors unanimously endorsed the CSC's Business Process Reengineering and Analysis (BPR&A) report, which was formally approved on 15 November 2000. The BPR&A endorsed SAP as the single commercial Enterprise Resource Planning (ERP) Package that was perceived as the enabler for the modernized services that CSC will provide. The SAP ERP is also the ERP solution set selected by the Defense Logistics Agency and the US Navy for their IT modernization activities. AMC is now engaged in the pick-and-shovel work of the mapping the Command's enterprises, again, in close partnership and team activity with the LMP contractor. CECOM was designated the first to field LMP. Equally important, it is that AMC also established a change management structure to deal with the entire AMC command's ability to accept, lead, and foster change to its organizations and practices while capitalizing on this standard core ERP solution set across the command.

Notwithstanding that CECOM was chosen, as first to field, the sequence of fielding did not mean that all Major Subordinate Commands within AMC were not fully engaged in the process from day one. Each of AMC's subordinate Commands remained deeply engaged and closely involved in: (1) the LMP "Command Neutral" Enterprise Design and Proof-of-Concept activities, (2) the Specialized Interface Activities, and, (3) the accommodation of "long lead-time" planning and programming activities.

Additionally, a network of designated "Change Agents" and processes for both the pre-deployment and post-deployment phases of AMC's LMP strategy were collectively dealt with to implement LMP AMC-wide organizationally and with process standardization goals in mind.

In addition, the contract, awarded by the CECOM Acquisition Center, required that CSC provide for the retention of expertise through job offers for all displaced Government employees at the Central Design Activities [CECOM's Industrial Logistics Systems Center (ILSC) and the Logistics Systems Support Center (LSSC)] within their current geographic area and with comparable salary and benefits. Approximately 210 of the available displaced Government employees from within the Logistics community at ILSC and LSSC accepted job offers from CSC. Also, all actions to transfer the workload and software for the Logistics Management System were successfully completed.

While not fully implemented, the LMP is a start at establishing a technology that enables and provides all of the infrastructure and tools to support knowledge management within an entire enterprise. While cultural and organizational changes are vital to achieving a knowledge management strategy, a lack of proper tools and technology infrastructure can lead to failure. Any technical solution must add value to the process and achieve measurable improvements. Properly assessing and defining Information Technology (IT) capabilities is essential. The LMP was a major breakthrough in logistics modernization that will have lasting impact throughout CECOM and AMC.

#### **4. Learning**

The best tools and processes alone will not achieve a knowledge management strategy. Ultimately, people are responsible for using the tools and performing the operations. Creating organizational behavior that supports a knowledge management strategy will continue long after the knowledge management system is established. Organizational learning must be addressed with approaches such as increasing internal communications, promoting cross-functional teams, and creating a learning community. Learning is an integral part of knowledge management. In this context, learning can be described as the acquisition of knowledge or a skill through study, experience, or instruction. Enterprises must recognize that people operate and communicate through

learning that includes the social processes of collaborating, sharing knowledge and building on each other's ideas. Managers must recognize that the knowledge resides in people, and knowledge creation occurs in the process of social interaction and learning.

A somewhat broader perspective on knowledge management is to use knowledge to continuously improve all types of organizational processes. Davenport and Prusak [Ref 6] state that there are a number of standard ways in which knowledge can be used. They are: (1) document experiences, like best practices and after action reports, which provide an historical perspective, (2) document what actually happens in a real life situation, this information is used to modify the work processes to conform to reality or to improve the process, (3) knowledge can also be used to assist workers in making judgments and finally, (4) knowledge can be used to improve structured workflows. The greatest challenge for any organization is to turn knowledge into action. Implementing continuous process improvement is a way to turn knowledge into action.

CECOM Acquisition Center is developing knowledge within the organization in many ways. They have active best practices identified on their Enterprise Learning Center, which is an intranet for the CECOM Acquisition Center and its customers. The goal of best practices transfer is to capture and leverage existing knowledge. Best practices are not intended to generate new knowledge. The goal of best practices is to reuse the knowledge others have already learned. This type of knowledge is normally captured using documents and the documents stored in retrievable databases. The Enterprise Learning Center is one such cataloged and retrievable database. Another organization-wide transfer is the transfer of expertise. Expertise is the result of combining specific skills with the experience to understand how to use them. One cannot be an expert in the field by just reading a book or attending a class. Developing expertise requires practicing those skills in a variety of situations and being able to apply and adapt them appropriately to achieve successful outcomes. Since expertise takes a long time to develop, it clearly is in an organization's best interest to find ways to develop expertise more quickly. One of the ways that family owned businesses transfer expertise is through apprenticeship. In family owned businesses, fathers teach sons and mothers teach daughters. The transfer of expertise is on a shortened timescale. Likewise, the CECOM Acquisition Center assigns new interns to seasoned contracting officers, and at

the end of the first year the intern is reassigned to another sector and another seasoned contracting officer. The CECOM Acquisition Center needs to continue to find ways to transfer expertise more quickly. Another transfer that is necessary is the transfer of experience. Experience is a mixture of lessons learned, cognitive assessments, relationships and preconceived ideas which when combined with intelligence, transforms information into usable knowledge. Experience is considerably more than technical expertise and is essential to understanding and correctly interpreting information coming into an organization from the outside. [Ref 28] The Army After Action Reviews are an excellent template for the CECOM Acquisition Center to emulate in capturing and transferring experience. Finally, the most challenging knowledge transfer is to transfer innovation. Innovation is predicated on the ability to integrate new information with existing knowledge to create something new. It takes both exposure to new thinking and the time to work out innovative ideas. Organizations where speed of delivery is the mantra often have difficulty transferring innovation. One major problem within most organizations is that they don't know what they don't know. Secondly, it is frequently difficult to transmit innovative ideas in organizations in ways ideas can be understood and acted upon. When an organization has a uniform culture and common definitions and understanding of all its terms, then the transfer is more likely to occur. The lesson here is that transfer of knowledge within an organization depends on the type of knowledge to be transferred. And each type of transfer requires a different strategy and framework. Best practices are meant to be transferred throughout an organization. Expertise transfer is more focused toward individuals. Experience is generally transferred to make teams more effective. And finally, innovation is transferred to stimulate both individuals and the whole organization with the goal of transforming the organization. The CECOM Acquisition Center is not as sophisticated as the knowledge management system just described, however, it does have active communities of practice. Knowledge communities must serve two strategic objectives within the organization. First they must facilitate knowledge development, meaning they must be able to identify, harvest and organize knowledge within the organization. Secondly, they must be able to apply knowledge, meaning they must be able to share, adapt and deliver business results through the application of organizational knowledge.

However, that is only the most basic knowledge management system. To take knowledge management to the next higher level, knowledge needs to be embedded into the organization's work processes. It should also be used to improve decision-making at all levels of the organization. Effective knowledge management systems need to be able to provide increased support and analysis that turns available information into useful knowledge. Efforts should also be made to consolidate and integrate enterprise-wide databases and data sources to improve consistency and integrity of information. And finally, a Knowledge Management system should be able to capture knowledge without extra effort. The same system that records the completion of work should also be capturing the knowledge.

## **5. Summary**

It is evident that the need for knowledge management translates throughout the entire enterprise. It is not a separate function characterized by a separate KM department or a knowledge management process; it must be embedded into all of the organization's business processes. Knowledge management is crucial to achieving permanent performance improvement and innovation. Efficient knowledge-intensive core processes and a fundamental architecture must be established to effectively initiate and implement knowledge management. Ideally, knowledge management implementation is an iterative process that starts with a clear business vision about what the organization wants to achieve.

## **D. PROCESS FLOW**

Professionals are probably considered the quintessential knowledge workers. In fact, there is an emphasis on knowledge as a core-generating trait of professionalism. [Ref 29] Within the literature on professional groups is an assumption that professionals already have in place the business processes needed for leveraging knowledge, and there is no compelling reason why these knowledge management processes should be changed. [Ref 30] In many respects this claim has merit since the knowledge management practices of professionals were developed over decades and there is natural reluctance to change practices without incurring unintended consequences. Professionalism provides a heightened need to recognize the existing knowledge management practices which may be independent of information technologies. Professionals use formal training,

credentials and apprenticeship programs to transfer knowledge. Within many professions there is a growing recognition dealing with knowledge loss by capturing the information in a database does not work. The reason is that the value of the knowledge is embedded in its tacit aspects, which cannot be captured on paper. Professionals feel that apprenticeship programs are a better way to deal with knowledge loss. Also consider that historically professionals go through a fairly strong socialization process before entering the mainstream of their profession. It is not until the professional has been socialized that he or she is able to bring their full experience to their customers. Through socialization, professionals share a significant quantity of tacit knowledge, which facilitates their communications. Finally, professionals draw upon considerable autonomy in their efforts. Professionals use self-governance at the group level to monitor norms within the profession. A professional organization, like NCMA has a vision to be the preeminent source of professional development for the practice of contract management. The above attributes describe all professionals in general and apply to the professionals within the CECOM Acquisition Center, especially its contracting officers and contract specialists. The role of professionalism can provide key insights into a knowledge management system. Based on the above, in organizations comprised of professionals it is necessary to understand where knowledge flows and where it is impeded. Understanding where and why practices and processes are common and where they are not.

## **1. High Level Functional Architecture**

The high level functional architecture is analogous to the foundational acquisition competencies listed within NCMA's CMBOK. Again that top-level taxonomy is:

- **Contract Principles** – which are the fundamentals of acquisition that all contracting professionals must comprehend.
- **Preaward** – are the activities and events that are required for awarding a contract.
- **Contract Administration** – are the issues that arise during the performance of a contract.
- **Subspecialties** – are those areas that require additional specialized knowledge.



- **General Business** – are portions of other disciplines relevant to contract management. [Ref 10]

In addition to those broad areas of knowledge are general business, which includes management, marketing, operations, accounting, economics, quantitative methods and finance. Underlying those broad knowledge areas are the disciplines of operations research, logic, psychology, philosophy, sociolinguistics, management science, management information science, organizational behavior, and management philosophy. In order to exercise good business judgment within the acquisition field, members require several additional core acquisition skills. As a profession, the acquisition field contains a unique body of knowledge, which must be mastered. It should be highlighted that without the necessary general business skills, the foundational competencies skills could not be developed, let alone utilized in the performance of one's duties. Core acquisition competencies are developed into skills and skills give an individual the ability to perform their day-to-day tasks in the acquisition field in order to conduct DoD business in the manner that is critical to achieving best-value acquisitions while simultaneously serving all stakeholders. Core acquisition skills further serve as basic building blocks to obtaining advanced and specialized acquisition skills

## **2. Subordinate Architectures**

Cascading from the foundational competencies NCMA defines subject matter competencies as a subset of the foundational competencies. These are the knowledge areas that contracting professionals need to know and demonstrate to be effective in daily activities.

To illustrate the cascade from foundational competencies to subject matter competencies Figure 5 demonstrates the five foundational competencies cascading into subject matter competencies.

### **NCMA's Foundational and Subject Matter Competencies**

<b>Contracting Principles</b>	
<b>Standards of conduct</b>	
<b>Laws and regulations</b>	
<b>Socioeconomic</b>	
<b>Contract structures</b>	
<b>Contracting methods</b>	
<b>Contract financing</b>	
<b>Intellectual property</b>	
<b>Contract Administration</b>	<b>Sub-specialties</b>
<b>Quality Assurance</b>	<b>Research and Development</b>
<b>Subcontract Management</b>	<b>A&amp;E and Construction</b>
<b>Modifications</b>	<b>Program Management</b>
<b>Disputes</b>	<b>Major Systems</b>
<b>Property</b>	<b>Services</b>
<b>Transportation</b>	<b>International</b>
<b>Contract Closeout</b>	<b>State and Local Government</b>
<b>Contract Termination</b>	
<b>General Business</b>	<b>Acquisition Planning/Strategy</b>
<b>Management</b>	<b>Acquisition Planning</b>
<b>Marketing</b>	<b>Contract Instruments</b>
<b>Finance</b>	<b>Proposal Preparation</b>
<b>Accounting</b>	<b>Sole Source Negotiations</b>
<b>Economics</b>	<b>Source Selection</b>
<b>Management Information Systems</b>	<b>Protests</b>
<b>Information Science</b>	

**Figure 5. The 5 Foundational Competencies Cascading into Subject Matter Competencies [Ref 10]**

Further cascading from the subject matter competencies, NCMA defines task level competencies as a subset of subject matter competencies. These are the more specific knowledge areas that contracting professionals need to know and demonstrate to be effective in daily activities. Appendix A illustrates the further cascading of foundational competencies to subject level competencies to task level competencies.

Figure 5 and Appendix A demonstrate the high-level architecture and subordinate architectures essential within an Acquisition Center similar to CECOM's. One can see the functional, subject matter and task level competencies and their cascading relationship from the broad to the more specific. What becomes important is the operations that are implied by the above architectures.

#### ***a Operations***

Operational subordinate architectures describe the operations in terms of how the knowledge within the knowledge management system is assured, represented, transformed transferred and utilized. The CECOM Acquisition Center authenticates

information within its databases in a variety of ways depending on the database. Accurate and complete database management is part of every supervisor's responsibilities within the CECOM Acquisition Center. In their performance standards, GS-15s and GS-14s are rated on five broad areas. They are: (1) compliance with CECOM Acquisition Center goals, which include entering obligation dollars timely, eliminating database errors, meeting cycle time goals for all acquisitions, meeting all AMC and Department of the Army metrics; (2) managing people by normalizing the workload within their area of responsibility, accurately reflecting utilized personnel within their area of responsibility, direct oversight of the source documents contracting officers and specialists use to make decisions to ensure quality contract actions are the norm as well as general counseling of employees; (3) organizational communication, (4) maintaining adequate internal controls to capture and correct systemic problems, as well as instances of fraud waste and abuse; and (5) educating the workforce. Each supervisor is personally responsible to ensure the workforce has received quality training during the year. By focusing the attention of senior management on database accuracy, the authentication of the raw data that is used to normalize workload and report organizational progress is assured with confidence. By concentrating on people management, communication and review, employees are afforded ample opportunity to get one-on-one assistance to ensure quality products are delivered to assure customer satisfaction.

***a. Vital and Critical Information***

The vital and critical information necessary for any organization are those measurements, which capture whether an organization is meeting organizational goals. Within the CECOM Acquisition Center those measurements are cycle time, dollars obligated, meeting all AMC and DA metrics, including Unliquidated Obligations goals, performance based service obligation goals, past performance Information Management Systems and annual Performance Assessment reports goals, as well as meeting the 80 hour training obligation required by the Defense Acquisition Workforce Improvement Act of 1991. Additionally, the Policy Group within the CECOM Acquisition Center performs random spot checks on contracting officer work folders to assure that quality checks are performed by the supervisors and as a double check on overall quality. A side benefit of the spot checks is to determine areas, which require additional training, and to

develop course materials for those training sessions. The vital information is generally all available within the CECOM Acquisition Center's Enterprise Learning Center, or ELC. The ELC was developed in an attempt to share cubicle knowledge throughout the workforce. The ELC resulted from a concept that encompassed a variety of activities. Its primary goal was to share ideas and information and to infuse the Acquisition Center workforce with an appreciation of collaborative teamwork. The activities include the Knowledge Center, the Procurement Contracting Officer Round Table, ELC training, early acquisition strategy sessions, the Acquisition Center monthly newsletter and the Contracting Officer Mentor Program. The foundation of the ELC is the CECOM Acquisition Center Knowledge Center. The Knowledge Center is an electronic repository for all activities that are conducted by the ELC. The CECOM Acquisition Center Knowledge Center was developed five years ago in partnership with Program Executive Office Command, Control, and Communications Tactical (PEO C3T). Usage on the Knowledge Center has grown exponentially. Earlier this year, the monthly "hits" on the Knowledge Center averaged over 100,000, or three times as many as two years prior. PCO roundtables are Communities of Practice. A new topic is chosen each month and the contracting officers get together and have an expert-to-expert discussion, which is open to experts and novices alike. During these sessions the transfer of knowledge and learning is quite evident. Another outgrowth of the ELC is the Mentor Program. The transition from contract specialist to contracting officer is a difficult step for many. CECOM Acquisition Center developed this Mentor Program for newly promoted contracting officers. Each new contracting officer is assigned an experienced mentor contracting officer with whom they can discuss problems and issues. Many of these relationships are lasting and mutually beneficial. The ELC is a good first step in capturing and sharing many of the ideas within a workforce.

#### **E. MEASURABLE CORE STRATEGIC OBJECTIVES**

One of the most interesting and challenging aspects of knowledge management is trying to measure and value knowledge. While extremely difficult to measure, the value of knowledge management should be demonstrable on three levels within the organization: job effectiveness, enterprise effectiveness, and support to strategic direction. Measurements that consistently measure those parameters are the

measurements that will offer the most insight to the effectiveness of the knowledge management program. In addition, the value of knowledge should also be assessed from three perspectives: the individual, the organization and the customer.

## **1. Metrics**

To ensure that metrics are consistent and can be used to periodically benchmark an organization four givens need to be in place: (1) metrics need to be tied to strategic goals, (2) there must be standard nomenclature so the measures created are understood the same way by everyone, (3) notwithstanding that most organization's measurement tools are home grown, there is a need for tools to assist in measurement, and (4) there should be clear linkages between knowledge management enablers, like the four pillars, and positive results of measurements.

A few of the CECOM Acquisition Center's measurements are as listed in the vital and critical information section under subordinate structures in this chapter. To repeat, they are: cycle time, obligations, meeting all AMC and DA metrics, including Unliquidated Obligations goals, performance based service obligation goals, past performance Information Management Systems and annual Performance Assessment reports goals, as well as meeting the 80 hour training obligation required by the Defense Acquisition Workforce Improvement Act of 1991.

## **2. Critical Knowledge Needed to Achieve Strategic Objectives**

As stated by Edward G. Elgart, Director of the CECOM Acquisition Center:

[The] CECOM Acquisition Center may be able to mitigate turnover problems occasioned by the exodus of experienced acquisition professional if it can find ways to transfer the vast breadth of knowledge to younger acquisition novices. The source selection evaluation process can present a problem even for most experienced acquisition specialist. For an uninitiated, inexperienced person, some source selection problems may present formidable challenges. Given the tremendous turnover within the acquisition community, we may have source selection evaluation boards comprised of complete novices. It is going to be very difficult for SSEB Chairmen and Factor Chairmen to be effective if they must train people as well as conduct a source selection. One way, by which we may overcome this challenge, is to provide source selection

evaluation teams with access to a Knowledge Asset. That asset would consist of a ‘community’ of experienced, intelligent people well versed in the source selection process. With an open forum available to newly hired, or newly promoted specialist, in which critical questions can be asked and critical issues can be addressed, we will be able to have more effective source selection teams. In the end, this will provide a better product for the Army. [Ref 18]

While the CECOM Acquisition center would benefit from a measurement that captured the knowledge gained by novices and experts alike, today an accurate measurement does not exist. Therefore, other types of measures are used. The first type is the anecdotal measurements. Although not scientific they are probably one of the most powerful means of demonstrating the impact of knowledge management because employees react positively to the stories that are repeatedly told to substantiate knowledge management expenditures. A second type of measurement is a perceptual measure. Perceptual measures are mainly formal or informal surveys of knowledge management users. While positive comments to surveys are generally the norm, many become accustomed to the knowledge management tools that are put in place and no longer see the value in each knowledge management tool. It’s only when the survey question is worded, “if the KM tool was taken away, would you notice?” Then the value of the tool becomes strongly positive. Another measure, that’s generally much more difficult to quantify is a financial metric. Any time a knowledge management tool or process can be quantified in terms of time savings, cost savings or cycle time reductions in both how much and in what ways, management should measure it. If that is not possible, organizations should ask their internal customers to put a value on the knowledge management service. Another common way to measure knowledge management tools is through usage. As noted in the prior section, the CECOM Acquisition Center Knowledge Center is used over 100,000 times per month. A more complex assessment is to determine how knowledge management initiatives contribute to different processes. By tracking the investment in knowledge management tools to disseminate and improve knowledge regarding the best value source selection against the time it takes to complete

best value source selections and the protest rate both before and after the launch of the KM tool, management may be able to link the progress to specific processes.

What is very important is to measure on a regular basis and the more frequent the better. Another important point is to not be afraid to experiment. Knowledge management an evolving practice. Measurements are not scientifically accurate, therefore, experiment to find better measures. Always measure what is strategically important. Choose metrics, which affect key strategic objectives. Always use conservative numbers. And finally use different measures for different stakeholders. Metrics must fit with what the stakeholders are trying to accomplish.

## **F. CHAPTER SUMMARY**

This chapter expanded the foundation for a Knowledge Management Model. It also identified foundational, subject matter and task level competencies essential to the acquisition professional as well as the skills and competencies of those professionals. The chapter began with an examination of the environment, both external and internal, followed with the four-pillars model of Knowledge Management, which included Leadership, Organization, Technology, and Learning. The chapter ended with the disciplines and competencies required for contracting professional of today and the future as well as the foundational subjects and skills essential to acquisition professionals.

THIS PAGE INTENTIONALLY LEFT BLANK



## V. CONCLUSIONS AND RECOMMENDATIONS

### A. INTRODUCTION

The purpose of this chapter is to provide conclusions and recommendations based on the findings in this study. The researcher will answer the thesis questions presented in Chapter I and will conclude with suggestions for further research into the area of knowledge management as a strategic initiative.

### B. CONCLUSIONS

Several conclusions can be drawn from the research and analysis provided in this thesis. Five particular conclusions are contained herein. These conclusions cover broad macro issues that this research addressed.

#### **1. Knowledge transfer within the Department of Defense is becoming more and more critical.**

Today's environment requires that organizations be adept at capitalizing on the individual and collective skills, expertise and experiences of the workforce to improve effectiveness and efficiency. With a reduced workforce and increased workloads organizations need to find ways to give novices skills, expertise and experiences in shorter timeframes. The continual downsizing of the Department of Defense's workforce and the increase in the overall workload demand that for the Department of Defense to fulfill its mission every worker needs to be fully proficient at all aspects of their job. In a traditional divisional and branch structure, workers have depth of experience with limited customers, which limit their overall experiential capability. Complicating knowledge transfer is that the experienced contract professionals are nearing retirement eligibility and taking their place are fewer and less experienced novices.

#### **2. Knowledge Management Systems are not just about technology.**

While it is true that technology can facilitate the use of knowledge throughout an organization, a knowledge management system cannot be solely based on a technology tool, for a comprehensive tool does not exist today. Effective knowledge management systems need to be able to provide increased support and analysis that turns available information into useful knowledge. Since the CECOM Acquisition Center is far from

implementing a knowledge management system that meets those criteria, efforts need to continue to consolidate and integrate enterprise-wide databases and data sources to improve consistency and integrity of information. To maximize utilization, the technology should be transparent to the users.

**3. Effective Knowledge Management Systems are part of an overall strategic plan that satisfies mission and vision goals of the organization.**

While not all knowledge management initiatives can be directly linked to more efficient uses of organizational resources, all should be conceived and designed to directly support an organization's strategic objectives. To date, developing and aligning knowledge management strategy has suffered from a lack of a systematic means of approach. Developing an effective knowledge management strategy requires careful analysis of the organization's overall strategic goals and an iterative approach to strategic development is recommended. Effective knowledge transfer considers organizational strategy and incorporates value propositions that are clearly understood. Methods of knowledge transfer should closely match the type of knowledge that needs to be transferred. Best practices can be transferred using a database, but transfer source selection experience is more likely best served by a community of practice. The CECOM Acquisition Center has a start in that it has identified knowledge management as one of its five themes within its strategic plan. The efforts already implemented with the Enterprise Learning Center is a good first step in implementing a multifaceted knowledge management strategic initiative.

**4. The knowledge, skill and abilities required to successfully perform the duties associated with contract management are an integral part of the contract professional's job.**

Those duties can be broken down into three functional competency levels: foundational, subject matter competencies and task level competencies. The foundational competencies are contracting principles, preaward, contract administration, subspecialties and general business, the subject matter and task level competencies cascade down from the foundational competencies in subordinate architectures.

5. **There does not appear to be a direct correlation between the effort expended on knowledge management and the value of knowledge management.**

Until a direct correlation can be established, it is important that organizations continue to develop adequate performance measurements that link the value of knowledge management efforts expended to the successful completion of strategic goals. If that means using anecdotal stories, perceptual measures, a financial metric or simply through counting tool usage that should continue.

### **C. RECOMMENDATIONS**

Several recommendations can be suggested from the research and analysis in this thesis. Peculiar recommendations are contained herein. These recommendations cover broad macro issues that this research addressed.

1. **Supervisors at all levels should determine through face to face discussions and review of contract files the level of experience for every employee under their supervision.**

Supervisors are responsible for ensuring the continued vitality of their organization. One important aspect of an organization described as having vitality is that workers have the requisite skills, expertise and experience to accomplish the mission. Through periodic meetings with employees and frequent review of their contract files, supervisors will develop a comprehensive understanding of each employee's strengths and weaknesses. Employee strengths can be matched with employee weaknesses.

2. **Organizations should be encouraged to link knowledge transfer between employees to the strategic goals of the organization.**

It is imperative that an organization understands its strategic goals before developing a knowledge management system. Transfer of knowledge starts with an understanding of what needs to be transferred and learned within an organization, which has that knowledge and the best methods of transfer. Transfer methodology needs to be specific for the knowledge to be transferred.

3. **Organizations should periodically reassess their knowledge management strategies to ensure continued efficacy.**

Even the most closely aligned strategic initiative needs to be periodically assessed to ensure continued alignment. The example used in Chapter IV was the three structural changes the CECOM Acquisition Center made to improve alignment with the changing environmental factors.

- 4. Contracting activities should foster an environment where experienced contracting officers and contract specialists want to transfer their knowledge to newer employees and those without the experience.**

Maintaining a positive corporate culture should include incentivizing workers to share and transfer knowledge with their coworkers. Incentives could include a simple letter of recognition, a monetary award or even time off. Although incentivizing an employee to do that which management expects without incentives may seem unorthodox, it is really no different than when the Government incentivizes contractors to perform beyond basic requirements.

- 5. Organizations should be encouraged to take a systems approach to developing a knowledge management system.**

The last twenty years has seen many beneficial management concepts, like Total Quality Management and Management By Objective, fail because they lacked an enterprise-wide framework and systems perspective. Today, a better-engineered knowledge management system will utilize a systematic framework of key elements which design and implement effective knowledge management programs, processes and initiatives.

#### **D. ANSWERS TO RESEARCH QUESTIONS**

The following primary and subsidiary research questions were addressed in the course of this study. Each question and its answer are provided below.

- 1. How can contracting organizations be improved by incorporating knowledge management as a strategic initiative?**

This question requires a response from three perspectives: the organization, the employee, and the customer. From the organization's standpoint, incorporating knowledge management assists the organization in meeting its mission. When an

organization incorporates knowledge management as a strategic initiative it means the organization aligned its knowledge management systems to priorities by focusing on the activities and initiatives that maximize the organization's value propositions to its customers, thereby achieving an enhanced understanding of common expectations of those customers which fosters customer loyalty and trust. A knowledge management initiative also assists with the propagation of knowledge throughout the organization, which is vital to the health, and survival of the organization. By propagating knowledge throughout the organization the organization gains efficiencies and those efficiencies allow the organization to take on more mission, more customers or both.

In an organization that employs a knowledge management strategic initiative, employees should gain skills, expertise and experience more quickly which will allow them to engage in more complex and challenging work sooner than without a knowledge management strategic initiative. The flow of communications in all directions should be improved, as should employee recognition. When employees are satisfied with their work environment, they are less apt to seek employment elsewhere. Since recruitment cost is high, a high retention rate results in cost avoidances, which can be plowed back into technology enhancements, which will further improve employee knowledge.

Customers that are served by organizations with knowledge management strategic initiatives should benefit through more effective channels of communications, collaborative behaviors and long-term relationship building.

## **2. What is knowledge management?**

As Karl Wiig stated, in 1993: "Knowledge management is the systematic, explicit, and deliberate building, renewal and application of knowledge to maximize an enterprise's knowledge-related effectiveness and return from its knowledge assets."

## **3. What are the elements of a knowledge management system?**

Generally, there are four elements of a knowledge management system, they are: (1) delineating the environment, (2) designing in a leadership, organization, technology, and learning, (3) determining the measurable core strategic objectives and finally, (4) determining process flows.

**4. Can the benefits of knowledge management be measured within the Communications Electronics Acquisition Center?**

Based on the literature review and the research conducted in this study it is apparent that a direct link between expenditures on knowledge management and the value of knowledge management cannot be established. However, until a direct correlation can be established, it is important that organizations continue to develop adequate performance measurements that link the value of knowledge management efforts expended to the successful completion of strategic goals. If that means using anecdotal stories, perceptual measures, a financial metric or simply through counting tool usage that needs to continue.

**5. How can the results of this study be generalized and applied to other acquisition organizations and processes?**

This research developed an eight-step knowledge management system model that could be applied by any contracting activity. The organization would begin by (1) reviewing its mission and vision; (2) developing its value propositions, (3) linking its value propositions to customers; (4) designing an organizational structure that can deliver its strategic initiatives to its customers, partners, stakeholders and employees, (5) develop the technologies that can deliver the ten functional information capabilities; (6) design in learning behaviors, (7) design in process flows that link back to the structure of the organization and its operations, and finally (8) define measurable core strategic objectives.

**E. SUGGESTIONS FOR FUTURE RESEARCH**

**1. Further develop the Knowledge Management framework**

A key to developing and institutionalizing an effective and dynamic Knowledge management system will be in implementing a formal progress and maturity framework for the organization. Follow-on research is necessary to formalize the framework and apply the key initiatives of this research.

**2. Identify and develop the required metrics to assess a Knowledge Management System's Value**

With the desired Knowledge Management goals to solve organizational issues and the expected benefits now understood, individual metrics must be designed to capture relevant, complete and timely effects of knowledge management systems.

### **3. Identify and develop specific processes**

Identify and develop specific processes to support a Knowledge Management System. Processes should be evaluated and tested to support a Knowledge Management System and structure.

THIS PAGE INTENTIONALLY LEFT BLANK



## **APPENDIX A. NCMA’S CONTRACTING PRINCIPLES FOUNDATIONAL, SUBJECT MATTER AND TASK LEVEL COMPETENCIES**

### **A. NCMA’S CONTRACTING PRINCIPLES FOUNDATIONAL, SUBJECT MATTER AND TASK LEVEL COMPETENCIES**

<b>Foundational</b>	<b>Subject Matter</b>	<b>Task Level</b>
Contracting Principles	Standards of conduct	Ethics
		Conflicts of Interest
		Improper Practices
	Laws and regulations	Contract Formation
		Agency
		Federal Statutes
		Federal Regulations
	Socioeconomic Programs	Uniform Commercial Code
		Small Business Concerns
		Small and Disadvantaged Business Concerns
		Labor Surplus Area
		Environmental Issues
	Contract Types	Labor Laws
		Fixed Price
	Contracting Methods	Cost Reimbursement
		Other Types
		Sealed Bidding
		Two-Step Sealed Bidding
		Negotiations
		Simplified Acquisitions
		Federal Supply Schedules
		Electronic Commerce
	Contract Financing	Generally Accepted Accounting Principles
		Cost Principles
		Cost Accounting Standards
	Intellectual property	Payments
		Audits
		Patent
		Data
		Copyright

**B. NCMA'S ACQUISITION PLANNING/STRATEGY FOUNDATIONAL,  
SUBJECT MATTER AND TASK LEVEL COMPETENCIES**

<b>Foundational</b>	<b>Subject Matter</b>	<b>Task Level</b>
Acquisition Planning & Strategy	Acquisition Planning	Market Research Acquisition Strategy Acquisition Plan Source Selection Plan
	Solicitation	Invitation For Bids (IFBs) Request For Technical Proposal (RFTP) Request for Proposal (RFP) Request For Quotation (RFQ) Broad Agency Announcements
	Proposal Preparation	Bid or No-bid Decision Technical/Management Proposal Cost Proposal Unsolicited Proposal
	Sole Source Negotiation	Fact Finding Setting Objectives Strategy and Tactics
	Source Selection	Organization Evaluation Procedures Discussions Debriefings
	Protests	Forums Alternative Disputes Resolution Procedures

### **C. NCMA’S CONTRACT ADMINISTRATION FOUNDATIONAL, SUBJECT MATTER AND TASK LEVEL COMPETENCIES**

<b>Foundational</b>	<b>Subject Matter</b>	<b>Task Level</b>
Contract Administration	Quality Assurance	Inspection Acceptance Warranty
	Subcontract Management	Privity of Contract Make-or-Buy-Program Consent to Subcontracts Contractor’s Purchasing System Review
	Modifications	Change Orders Supplemental Agreements Constructive Changes Administrative Changes
	Property Administration	Property Control System Records and Reports
	Transportation	Modes of Transportation Transportation Related Services
	Disputes	Forums Alternative Disputes Resolution Procedures Extraordinary Contractual Relief
	Contract Closeout	Physical Completion Administrative Closeout
	Contract Termination	Convenience Termination Default Termination

**D. NCMA'S SPECIALIZED KNOWLEDGE FOUNDATIONAL, SUBJECT MATTER AND TASK LEVEL COMPETENCIES**

<b>Foundational</b>	<b>Subject Matter</b>	<b>Task Level</b>
Specialized Knowledge	Research and Development	R&D Contract Grant Cooperative Agreement Independent Research and Development
	A&E Services/Construction	A&E Selection Process Standard Procurement Process Design/Build
	Information Technology	Network Systems Telecommunications Electronic Commerce Enterprise Resource Planning Systems
	Major Systems	System Acquisition Process Program Management PM – Contracting Officer Relationship
	Services	Advisory and Assistance Services Personal Services
	International Contracting	Agreements and Restrictions Export Controls Foreign Military Sales
	State and Local Government	Authority Organization Intergovernmental Relations

**E. NCMA’S GENERAL BUSINESS FOUNDATIONAL, SUBJECT MATTER  
AND TASK LEVEL COMPETENCIES**

<b>Foundational</b>	<b>Subject Matter</b>	<b>Task Level</b>
General Business	Management	Principles Systems and Processes Human Relations Organizational Behavior Organizational Communication
	Marketing	Organizational/Industrial Marketing Product/Service Planning Promotion Pricing
	Operations Management	Production/R&D/Services Logistics Procurement
	Finance	Corporate Financial Reporting Financial Analysis
	Accounting	Managerial Cost Auditing Budgeting
	Economics	Principles Managerial Micro Macro
	Quantitative Methods	Statistics Deterministic Models Stochastic Models
	Information Science	Information Management Programming Database Management

THIS PAGE INTENTIONALLY LEFT BLANK

## LIST OF REFERENCES

1. Newing, Rod. "From The Ancient Greek To Modern Databases: Culture and Origins." The Financial Times, April 28, 1999
2. Wiig, Karl M. "Knowledge Management Foundations Vol 1, 2 and 3. Schema Press, 1993
3. Stewart, Thomas, "Brainpower." Fortune, April 1991
4. Wiig, Karl M. "Knowledge Management: Where Did It Come From And Where Will It Go?" Expert Systems with Applications – Programmer Press/Elsevier Vol 14 (Fall 1997)
5. Nonaka, Ikujiro and Hirotaka Takeuchi. "The Knowledge Creating Company" Oxford University Press 1995.
6. Davenport, Thomas and Laurence Prusak "Working Knowledge. How Organizations Manage What They Know." Harvard Business School Press, 1998
7. Hope, Jeremy and Robin Fraser "Beyond Budgeting...Breaking Through The Barrier To The Third Wave." Management Accounting, 1997
8. Hibbard, J "Knowing What We Know" Information Week, 20 October 1997
9. Stankosky, Michael; A. "A Theoretical Framework" Special Millennium Issue KM World, 2000
10. Bruce, David L., Marlys Norby and Victor Ramos "Guide To The Contract Management Body Of Knowledge (MCBOK) 1<sup>st</sup> Edition, National Contract management Association, September 2002
11. CECOM Regulation 10-1
12. Kontzer, T. "Search On," Information Week No 923, 20 January 2003
13. Gilchrist, A. "Corporate Taxonomies: Report On A Survey Of Current Practices," Online Information Review, Vol 25, No 2

14. Varian, H and P. Lyman, "How Much Information,"  
<http://www.sims.berkeley.edu/how-much-info/index-html>, 2000
15. Davenport, Thomas, J Harris, D. De Long and A. Jacobson, "Data To Knowledge To Results: Building An Analytic Capability," California Management Review, Vol 43, No 2, Winter 2001
16. General Accounting Office Report, GAO-01-565T, released 29 March 2001, "Human Capital: Major Human Capital Challenges At The Departments Of Defense and State"
17. "Shaping The Civilian Acquisition Workforce."  
<http://www.acq.osd.mil/dpap/report1000.pdf>, October 2000
18. Frey, Kimberly, Naval Postgraduate School Thesis: "The Changing Face Of The Contracting Professional in the Department of Defense, December 2001
19. Elgart, Edward G. "Source Selection Evaluation Criteria,"  
<https://www.kc.us.army.mil/ssecka.nsf/Kmap?OpenView>
20. Calabrese, Francesco, "A Suggested Framework Of Key Elements Defining Effective Enterprise-wide Knowledge Management Programs," The George Washington University, 2000
21. Despres, Charles and Daniele Chauvet, "A Thematic Analysis of the Thinking In Knowledge Management, The Thesues Institute, 1999
22. Senge, Peter M. "The Fifth Discipline – The Art of Learning Organization>" Bantam Doubleday Dell Publishing Group, 1990
23. Tedeschi, Kenneth L., Contracting Officer, CECOM Acquisition Center, Fort Monmouth, NJ. Interview, June 2001.
24. Welsh, Robert A. "The Procurement Manager of the Future." Contract management, July-August 1997
25. CECOM Acquisition Center, Appreciative Interviews with various customers, Spring 2000.



26. Kaplan, Robert S. and David P. Norton, "The Balanced Scorecard: Translating Strategy Into Action," Harvard Business School Press, 1993
27. CECOM Acquisition Center Strategic Plan, 2001
28. The GartnerGroup, "KM Benefits: From Building Productivity to Creating Wealth," GartnerGroup RAS Services, 2000
29. Geisler, Eliezer, "Harnessing The Value of Experience in the Knowledge-Driven Firm," Business Horizons, May-June 1999.
30. Halliday, Terrance C, "Beyond Monopoly," University of Chicago, 1987
31. Davenport, Thomas and J. Glaser, "Just in Time Delivery Comes to Knowledge Management," Harvard Business Review, July 2002

THIS PAGE INTENTIONALLY LEFT BLANK

## **INITIAL DISTRIBUTION LIST**

1. Defense Technical Information Center  
Fort Belvoir, Virginia
2. Dudley Knox Library  
Naval Postgraduate School  
Monterey, California
3. Professor David V. Lamm, Code SBPP/Lt  
Naval Postgraduate School  
Monterey, California
4. Professor Donald Summers, Code  
Naval Postgraduate School  
Monterey, California
5. Joseph DiGiacomo, CECOM Acquisition Center  
ATTN: AMSEL-AC-CC  
Fort Monmouth, New Jersey